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of
Agriculture
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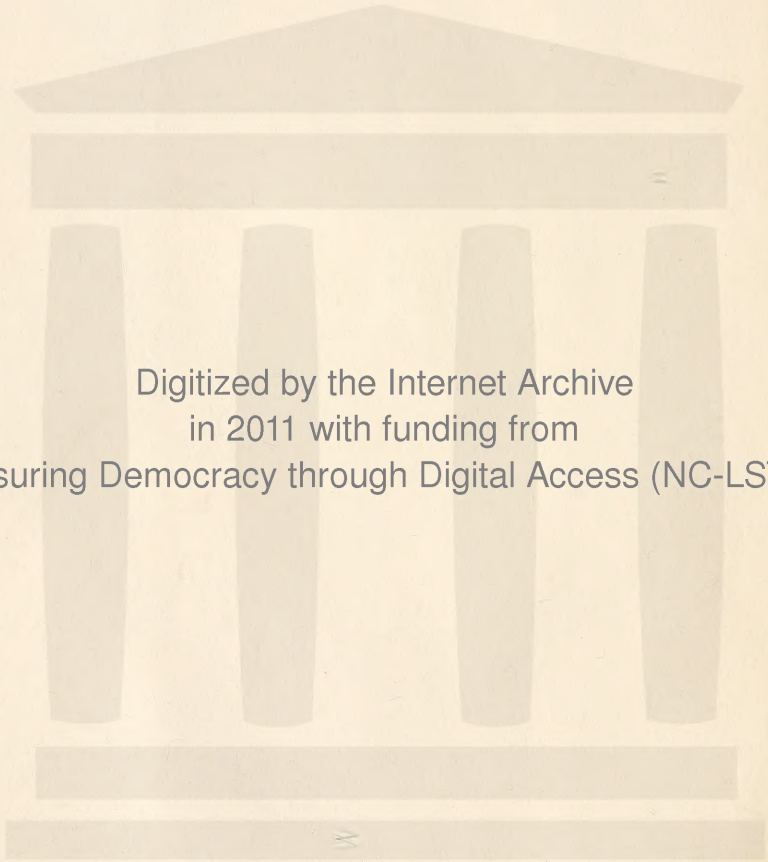

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REPORT

of

The North Carolina Department of Agriculture

For the Biennium 1938-1940

OWEN G. DUNN
STATE PRINTER
NEW BERN, N. C.

LETTER OF TRANSMITTAL

To His Excellency, CLYDE R. HOEY,
Governor of North Carolina:

SIR:

In compliance with Chapter 248, Public Laws of 1929, I submit the following report of the work of the Department of Agriculture for the biennium 1938-1940.

Respectfully,

W. Kerr Scott

Commissioner of Agriculture.

RALEIGH, N. C.,
NOVEMBER 1, 1940.

REPORT

OF

The North Carolina Department of Agriculture

For the Biennium 1938-1940

247165

PERSONNEL
OF THE
STATE DEPARTMENT OF AGRICULTURE

W. KERR SCOTT, *Commissioner*

MRS. L. L. STEVENS	Shawboro, N. C.
C. S YOUNG	Shelby, N. C.
D. R. NOLAND	Clyde, N. C.
CLAUDE T. HALL	Woodsdale, N. C.
J. H. POOLE	West End, N. C.
M. L. ADERHOLDT	Lexington, N. C.
CHAS F. CATES	Mebane, N. C.
W. G. HARGETT	Richlands, N. C.
LIONEL WEIL	Goldsboro, N. C.
W. I. BISSETTE	Grifton, N. C.

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D. S. COLTRANE	*Assistant to the Commissioner*
MYRTHA FLEMING	*Principal General Clerk*
MARY KNIGHT	*Principal General Clerk*
LOUIS H. WILSON	*Editor of Publications*
A. R. POWLEDGE	*Senior Auditor*
DONNIE M. NORMAN	*Senior Accounting Clerk*
C. P. DEYTON	*Principal Accounting Clerk*
KATHERINE PALMER	*Junior Accounting Clerk*
JERRIE WHELESS	*Senior Stenographer Clerk*
CHAS. HIGGS	*Janitor-Clerk*
WORTH JEFFREYS	*Janitor-Messenger*
ROBERT HARRIS	*Janitor Messenger*

INSPECTION

W. E. FULLER	*Junior Dairy Specialist*
CHAS. H. GODWIN, JR,	*Senior Food Inspector*
MARTIN MCCALL	*Senior Feed Inspector*
E. J. HARRINGTON	*Senior Fertilizer Inspector*
W. H. FERGUSON	*Fertilizer Inspector*
SIDNEY B. CLEMENT	*Fertilizer Inspector*
JOHN F. REINHARDT	*Fertilizer Inspector*
J. W. TURNER	*Fertilizer Inspector*

MARKETS

R. B. ETHERIDGE	*Chief*
BUXTON WHITE	*Senior Marketing Specialist*
C. W. SHEFFIELD	*Senior Marketing Specialist*
PAUL L. FLETCHER	*Senior Marketing Specialist*
A. B. HARLESS	*Senior Marketing Specialist*
H. T. WESTCOTT	*Senior Marketing Specialist*
W. P. HEDRICK	*Senior Marketing Specialist*
GEO. R. ROSS	*Senior Marketing Specialist*
WILLIARD HOLDEN DARST	*Associate Marketing Specialist*
RALPH BOGAN KELLY	*Associate Marketing Specialist*
ISABELLE MOSELEY	*Junior Marketing Specialist*

GRACE MILDRED HOWELL.....*Junior Stenographer Clerk*
MARY C. HUTCHINSON.....*Junior Stenographer Clerk*
RUTH CASH.....*Junior Stenographer Clerk*
CELESTA BALLANCE.....*Junior Stenographer Clerk*
W. G. JONES.....*Senior Telegraph Operator*

CREDIT UNION

D. R. GRAHAM.....*Senior Auditor*
ALEX S. BYNUM.....*Junior Auditor*
JEANETTE COHEN.....*Junior Stenographer Clerk*

DAIRY

C. W. PEGRAM.....*Dairy Specialist*

ENTOMOLOGY

C. H. BRANNON.....*Senior Entomologist*
J. A. HARRIS.....*Senior Entomologist*
D. L. WRAY.....*Associate Entomologist*
C. S. BRIMLEY.....*Associate Entomologist*
P. G. CRADDOCK.....*Senior Apiary Inspector*
PAULINE P. NEWSOM.....*Senior Stenographer Clerk*
C. H. HILL.....*Japanese Beetle Inspector*

SEED LABORATORY

J. W. WOODSIDE.....*Senior Botanist*
S. D. ALLEN.....*Senior Seed Analyst*
ELIZABETH EBY.....*Senior Seed Analyst*
MAGDALENE BRUMMITT.....*Junior Seed Analyst*
MRS. M. N. MATTOCKS.....*Junior Stenographer Clerk*
ELSIE W. EARP.....*Junior Seed Analyst*
MARGARET RAPER.....*Junior Stenographer Clerk*
C. H. LUTTERLOH.....*Senior Feed Inspector*
JOSHUA S. JAMES.....*Senior Feed Inspector*
T. A. HOLCOMBE.....*Senior Feed Inspector*

ANALYTICAL

B. W. KILGORE.....*Senior Chemist*
W. A. QUEEN.....*Senior Chemist*
L. B. RHODES.....*Senior Chemist*
E. W. CONSTABLE.....*Senior Chemist*
L. M. NIXON.....*Senior Chemist*
Z. B. BRADFORD.....*Senior Chemist*
E. T. HORD.....*Senior Chemist*
J. S. PITTARD.....*Senior Chemist*
H. F. PICKERING.....*Senior Chemist*
W. P. MATTHEWS.....*Junior Chemist*
L. W. PURDY.....*Junior Chemist*
H. D. MATHESON.....*Junior Chemist*
J. O. DUNSTON.....*Junior Chemist*
DAVID E. BUFFALOE.....*Junior Chemist*
CHARLES C. OATES, JR.....*Junior Chemist*
SARAH G. ALLEN.....*Principal General Clerk*
HEBER B. HATCH.....*Principal General Clerk*
VELVA HUDSON.....*Senior General Clerk*
M. S. BIRDSONG.....*Junior General Clerk*
MILDRED G. JACKSON.....*Senior Stenographer Clerk*
GRACE MEWBORN.....*Senior Stenographer Clerk*
L. V. AMBURGEY.....*Microscopist*
W. E. MCNEILL.....*Senior Food Inspector*
JAMES A. BELTON.....*Junior Food Inspector*
MOSES LORD.....*Laboratory Helper*
ELVIN ROGERS.....*Laboratory Helper*
ROBERT L. HARRIS.....*Laboratory Helper*

CROP STATISTICS

W. T. GARRISS.....*Junior Statistician*
HENRY G. BROWN.....*Senior Statistical Clerk*
E. R. SIMPSON.....*Senior Statistical Clerk*
WILLIAM T. WESSON.....*Senior Statistical Clerk*
RUSSELL P. HANDY.....*Senior Statistical Clerk*
SARAH DRAKE.....*Senior Statistical Clerk*
BESSIE KELLOGG.....*Senior Statistical Clerk*
MARAGRET TAYLOR.....*Senior Statistical Clerk*
C. R. SUMRELL.....*Junior Statistical Clerk*
MRS. ESPY S. BOLGER.....*Junior Accounting Clerk*
HERBERT BARNES.....*Senior General Clerk*

MUSEUM

H. T. DAVIS.....*Senior Curator*
H. H. BRIMLEY.....*Senior Curator*
ROXIE COLLIE SIMPSON.....*Preparator and Taxidermist*
PAT PITTMAN.....*Junior General Clerk*
OWEN WOODS.....*Janitor*
PATTIE DANIELS.....*Maid*

VETERINARY

WILLIAM MOORE.....*State Veterinarian*
L. J. FAULHABER.....*Associate Veterinarian*
W. R. BAYNES.....*Associate Veterinarian*
MAURICE A. SCHOOLEY.....*Junior Veterinarian*
JOE F. BAXTER.....*Junior Veterinarian*
C. E. COX.....*Junior Veterinarian*
C. B. RANDALL.....*Junior Veterinarian*
CHARLES R. BORDER.....*Junior Veterinarian*
WAYNE D. COLLINS.....*Junior Veterinarian*
WILLIAM R. BEASLEY.....*Junior Veterinarian*
URBAN E. WHATLEY.....*Junior Veterinarian*
C. EDWIN HOFMANN.....*Junior Veterinarian*
L. J. FOURIE.....*Junior Bacteriologist*
WOODSON FUTRELL.....*Junior Bacteriologist*
JOHN J. FILICKY.....*Junior Bacteriologist*
GRACE JOHN.....*Senior Stenograhper Clerk*
EDNA LEE SIMPSON.....*Junior Stenographer Clerk*
H. S. WILFONG.....*Junior Bacteriologist*
R. C. NOBLE.....*Hatchery and Flock Inspector*
T. L. WELLBORN.....*Hatchery and Flock Inspector*
BRUCE H. OVERMAN.....*Hatchery and Flock Inspector*
E. L. BURGESS.....*Hatchery and Flock Inspector*
JAMES J. PAGE.....*Hatchery and Folck Inspector*
A. R. GATTIS.....*Hatchery and Flock Inspector*
COLEMAN ABSHER.....*Hatchery and Flock Inspector*
J. H. OLIVER.....*Hatchery and Flock Inspector*
CARL H. TOWER.....*Hatchery and Flock Inspector*
WALTER C. SMITH.....*Hatchery and Flock Inspector*
W. W. KEEVER.....*Hatchery and Flock Inspector*
N. P. MCDUFFIE.....*Hatchery and Flock Inspector*
FRANK HALL.....*Laboratory Aid*
FRANK HOWARD.....*Laboratory Helper*

TEST FARMS

F. E. MILLER.....*Director*
KATHLEEN HARRISON.....*Senior Stenographer Clerk*
J. L. REA, JR.....*Superintendent*
F. B. HARRIS.....*Herdsman*
HOLLAND ALLEN.....*Foreman*
A. P. LEFEVERS.....*Assistant Field Crops*

CARLOS MANNING—*Assistant Field Crops*
HERBERT ALLEN—*Assistant Livestock*
DEMPSEY ALLEN—*Animal Feeder*
E. G. MOSS—*Superintendent*
JOE L. RAND—*Foreman*
CLIFTON L. BLACKWELL—*Assistant Foreman*
E. FLOYD—*Junior Stenographer Clerk*
R. E. CURRIN, JR.—*Superintendent*
W. C. ALLSBROOK—*Foreman*
MARY W. CURRIN—*Junior Stenographer Clerk*
DEAN W. COLVARD—*Superintendent*
J. R. B. WILLIAMSON—*Dairy Herdsman*
J. ERNEST LOVE—*Poultryman*
W. M. WHISENHUNT—*Foreman*
W. W. ROSS—*Assistant Horticulturist*
E. W. RHODES—*Assistant Field Crops*
R. L. YORK—*Assistant Dairyman*
HAZEL DRAKE—*Junior Stenographer Clerk*
CHAS. T. DEARING—*Superintendent*
D. P. SOUTHERLAND—*Foreman*
C. O. BOLLINGER—*Poultryman*
FRED STEVENS, JR.—*Dairyman*
B. L. WILLIAMS—*Junior Stenographer Clerk*
J. W. HENDRICKS—*Superintendent*
GRADY BERRY—*Foreman*
LACKEY BENFIELD—*Assistant Horticulturist*
ROSE E. BRADFORD—*Junior Stenographer Clerk*

BLISTER RUST

H. B. TEAGUE—*State Leader*
CARSON W. SWANGER—*Inspector*
MRS. HAZEL W. PETTIT—*Junior Stenographer Clerk*
OSCAR V. COULTER—*Inspector*
HOBERT A. WHITMAN—*Inspector*
MARK M. FERGUSON—*Inspector*

SOIL TESTING

I. E. MILES—*Director*
FRANK H. BROWN—*Junior Chemist*
MRS. J. F. JEFFREYS, JR.—*Junior Stenographer Clerk*
CORNELIA MCKAUGHAN—*Junior Stenographer Clerk*
ARTHUR GILES—*Laboratory Aid*

STATE WAREHOUSE SYSTEM

A. B. FAIRLEY—*Superintendent*
C. R. REYNOLDS—*Chief Cotton Classer*
JOE E. TROWBRIDGE—*Senior Cotton Classer*
ROBERT S. POU—*Warehouse Examiner*
FRED P. JOHNSON—*Gin Expert*
MRS. J. N. MASON—*Senior Stenographer Clerk*
MRS. HALLIE K. MORROW—*Senior Stenographer Clerk*
ELIZABETH FLEMING—*Junior General Clerk*
J. B. HAYWOOD—*Cotton Classer*
E. L. UPCHURCH—*Senior General Clerk*

N. C. STATE FAIR

J. S. DORTON—*Manager*
EDNA DEES—*Senior Stenographer Clerk*
G. C. ELLIS—*Caretaker*

WEIGHTS AND MEASURES

C. D. BAUCOM—*Superintendent*
JOHN A. COOK—*Inspector*

GEORGE S. TURNER.....*Inspector*
H. W. HOOD.....*Inspector*
G. C. BOSWOOD.....*Inspector*
W. C. BARNETT.....*Inspector*
DORIS E. POWELL.....*Junior Stenographer Clerk*
WILBERT SPRUELL.....*Helper*

COOPERATIVE INSPECTION SERVICE

W. A. BARWICK.....*Egg Grader*
G. H. WHEELOUS.....*Egg Grader*
McREE DAVIS.....*Egg Grader*
H. D. WILSON.....*Egg Grader*
H. P. HALL.....*Egg Grader*
T. E. PETERSON.....*Egg Grader*
D. A. BASS.....*Egg Grader*
S. M. JAMES.....*Egg Inspector*

BIENNIAL REPORT
OF THE
NORTH CAROLINA DEPARTMENT OF AGRICULTURE

By W. KERR SCOTT, *Commissioner of Agriculture*

Creation of a public consciousness as to the need for an enlarged agricultural marketing program and the strict enforcement of regulatory, inspectional and control laws for the protection of farmers and honest manufacturers are among the outstanding accomplishments of the North Carolina Department of Agriculture during the biennium.

Consistent with the demand for enlarged services in the fields of marketing and control work relating to farming, expansions have been made in all divisions directly serving the farmer.

A more sympathetic understanding and appreciation of agricultural needs by the 1939 General Assembly has made possible many expansions of service to agriculture, including the establishment of a Soil Testing Division which enables the Department to furnish growers valuable information as to the fertilizer needs of their land, information that will result in a more intelligent and economical use of fertilizers.

Changes have been made in laws and regulations governing inspectional and control work relating to agriculture only after hearings or consultations with farmers and representatives of affected industries.

The strict enforcement of laws and regulations designed to protect the farmer and honest manufacturer has contributed to the building of a more profitable farm program and a more substantial agricultural industry.

Expansion of agricultural marketing work still heads the list of needs of North Carolina farmers. An enlarged, practical marketing program is essential to a well-balanced farm program.

Substantial contributions have been made by the Department in bringing the need for better marketing facilities to the attention of Congress. The Department will continue to campaign for an enlarged marketing program, recognizing such a program as vital to the economic well-being of the National and State farm population.

A report of the Department's progress during the biennium follows:

Chemistry: Strict enforcement of regulatory, inspectional and control laws has increased the value of services rendered in the Chemistry division. A total of 14,181 analyses of fertilizers, fertilizer materials, feeds, cottonseed meals, limes and land plaster, limes and marl, insecticides and fungicides has been made during the biennium. A total of 4,019 samples of foods intended for human consumption were analyzed. A total of 3,555 food plant inspections were made in the interest of food sanitation.

Test Farms: With the completion of a new Federal office building and laboratory with $80,000 appropriated by Congress, the Tobacco Station at Oxford is now recognized as the largest in the Nation. The addition of 248 acres of land adjoining the Upper Coastal Plain Test Farm at Rocky Mount gives the State the largest peanut research station in the Nation. All six test farms are in better physical condition than at any time in history. The agricultural research program on all test farms has been enlarged, particularly in the fields of tobacco insect and disease control, small grain improvement and peanut investigations. Other test farm programs have been improved in proportion to the increased research work and attendance at field days has totaled 25,000 a year.

Markets: Marketing programs designed to increase growers' incomes through the promotion of better grading and packing practices have been definitely beneficial and successful. New programs and expansion of other services include enforcement of an egg storage law enacted by the 1939 General Assembly; establishment of grades for lespedeza seed; promotion of dairy products through the organization of Dairy Council units; "rehabilitation" of the commercial Irish potato industry through the promotion of approved grading, packing and merchandizing methods; increasing the sale of North Carolina feeder cattle through a comprehensive marketing bulletin; expansion of agricultural market news services for growers and others; enlarged service to tobacco growers in presenting valuable information on grades and marketing practices; enforcement of new regulations to protect farmers from losses due to the sale of inferior seed Irish potatoes.

Veterinary Division: Bang's disease, most destructive of the maladies affecting dairy cattle, "is definitely on its way out" in North Carolina. An appropriation was secured from the 1939 General Assembly to match federal funds to pay owners for diseased animals slaughtered, and during the fiscal year ending June 30, 1940, a total of $20,320 was paid on 886 claims. Definite progress has been made in eliminating Pullorum disease, a costly disease of baby chicks. Nine veterinarians have been employed

in an effort to control hog cholera and other swine diseases in the commercial areas.

Dairy Division: Check tests for butter-fat have been made on approximately 25,000 samples, necessitating 1,500 investigations. The work of licensed testers has been checked and the sampling and weighing of milk has been supervised regularly. Legislation has been sponsored and enacted to secure records on creamery and milk products, thus enabling the Division to furnish accurate information on the growth of the dairy industry.

Warehouse: A modern, brick building for cotton classing has been constructed at a cost of approximately $30,000, 40% of which was obtained from the federal government, enabling the Division to give prompt and efficient service in cotton classing for the farmers of the State. Sixty per cent of the State's cotton crop has been handled through this Division. There is a licensed warehouse in every cotton-producing county.

Credit Unions: Fifty new credit unions have been organized during the biennium, bringing the total to 125. Membership has been increased from 12,343 on June 30, 1938 to 22,466 on June 30, 1940, and over the corresponding period loans have been increased from $5,863,366 to $10,704,704.

Entomology: An extensive soil poisoning program to control the spread of the Japanese beetle, deadly enemy of 300 agricultural plants and grasses, has been made possible with an appropriation of $90,000 by the 1939 General Assembly. Substantial progress has been made in controlling American foulbrood, a bee disease which is steadily decreasing. Blister rust, a disease of white pine, has been kept out of the State under a preventative program. Other control programs have been enlarged.

Statistics: The North Carolina Crop Reporting Service is officially rated *third* in the United States. A dairy manufacturers' report, special truck crop reports, grain reports of thresher operators, price information service rendered the coordinating committee of the U. S. Census, formation of Junior Crop Reporting Clubs are included in the expanded program of the Division during the biennium.

Weights and Measures: A total of 122,467 weights, measures and devices were inspected of which 106,004 were approved, 13,346 condemned; 2,266 confiscated and 851 released. A total of 1,146 heavy duty scales were tested and requests for tests justify an additional testing unit.

Accounts: Economy has been effected through the establishment of a centralized accounting office through which receipts and disbursements for all divisions are handled. Prompt and

efficient service has been rendered in the handling of fertilizer, feed, seed and other tax tags. All accounts have been submitted and approved by the Budget Bureau.

Seed Laboratory: A total of 23,802 samples of seed were tested during the biennium, representing a 15 per cent increase compared with the previous biennium. Coöperation with federal authorities in connection with the Federal Seed Act has resulted in a better control of the quality of seed produced in other states and purchased by our farmers. Strict enforcement of the State Seed Law has enabled growers to purchase seed of known quality.

State Museum: More than 400,000 persons have visited the Museum during the biennium. Major additions to the exhibits total 1,116. Coöperative work with federal agencies has made it possible to further increase the number of exhibits. Valuable assistance has been rendered in revising the book, "Birds of North Carolina."

Soils Testing: Established as a Division with funds obtained from a special tax levied on fertilizers by the 1939 General Assembly, the Soil Testing Division has become one of the most valuable service units of the Department. Free soil tests are being made for growers; they are furnished information on crop adaptations, together with the analysis and quantity of fertilizers needed to produce crops economically. Since the program was inaugurated July 15, 1939, more than 70,000 different tests have been made on 6,500 soil samples furnished by farmers.

Publications: The "Agricultural Review" mailing list has been increased from 19,000 to 29,000 during the biennium, furnishing farmers and others timely information of value, including tables showing low analysis and incorrectly labeled feeds, adulterated and misbranded foods and mislabeled seeds. A general increase in stories furnished newspapers and press associations has been reported. Requests for feature articles for all publications have been answered promptly. Enforcement of regulatory, inspectional and control laws has been made easier and more effective through publication of news stories and coöperation of newspapers and press associations.

State Fair: The North Carolina State Fair, taken over by the Department in 1937 following operation under private lease, has been an outstanding agricultural, educational and financial success during the biennium. For four years, the number of individual exhibitors has been increased and premiums have been increased. The large attendance at each exposition and the increase in the number of individual exhibitors attest the confidence of the people in a State-owned and State-operated Fair.

NORTH CAROLINA AGRICULTURAL PRODUCTION, 1939-40

D. S. COLTRANE
Assistant to the Commissioner

Although cash income from farm marketings in 1939 and 1940 fell below the high 1937 and 1938 level, changes in farm production indicate that North Carolina farmers are taking steps toward a better balanced agricultural program. The production of hay and other feed crops, legumes for soil improvement, livestock and poultry continued to increase. The largest crops on record were produced in 1940 for hay, soybeans and grapes. Peanut production was only slightly less than the record 1937 crop, and the largest wheat crop since 1901 was threshed. The number of cattle on farms on January 1, 1940, has been exceeded only once while hog numbers for the same date were the largest in 18 years. Tobacco production was cut drastically in 1940 from the record breaking 1939 crop, but cotton made a terrific come back, producing by far the highest yield of lint per acre in the State's farming history. As of November 1, the 1940 yield was estimated at 434 pounds per acre compared to 296 pounds in 1939 and 278 pounds for the 10-year (1929-38) average. Although the 1940 cotton acreage was increased only 10 per cent, the total production, second in lespedeza, seed and peanuts, and third in nearly twice as large as the 1938 harvest. North Carolina ranks fourth in the nation in cash income from crops, first in tobacco production, second in lespedeza, seed, and peanuts, and third in the production of sweet potatoes.

EFFICIENT PERSONNEL

It is gratifying to come to the close of another biennium with a feeling that we can give good account of the trust and responsibilities imposed upon us. We have an efficient and well qualified corps of employees, and they have diligently applied themselves to the tasks assigned them. They have proven their interest in the work and their loyalty to the State Department of Agriculture as well as the people we have endeavored to serve. We can only express to them our deep appreciation of the support they have given the administrative division and for their willingness to put forth every effort to discharge the responsibilities and work assigned them.

The State Department of Agriculture, as you no doubt realize, is one of the major agencies of the State. A careful study of these reports reflects the importance of the work assigned to this

Department, and discloses the magnitude of the problems with which we are confronted that directly affect the interest of our farmers, and in general, our entire citizenship.

REVENUE

The detailed financial statement shows the sources and amounts of revenue collected by the Department during the biennium. The total receipts for the biennium amount to $995,799.60 compared with $867,916.02 for the previous biennium, which is an increase of $127,883.58. The five cents per ton increase in fertilizer, feed, and cottonseed meal inspection taxes granted by the 1939 General Assembly, and made effective July 1, 1939, accounts for $76,947.02 of this increase. The remaining increase; namely, $50,936.56 is due to an increase in the sale of feed and seed tags; in fact, increased revenue is reported from most all sources. This is, no doubt, due to strict enforcement of the revenue raising provisions of the laws, which the Department enforces. It is, also, due to revenue derived from such laws as the one regulating the sale of canned dog food, which in the fiscal year, July 1, 1939-June 30, 1940, brought in $3,619.05. An Act passed by the 1939 General Assembly providing for an annual registration of each brand of feed with the $1.00 registration fee produced during the first year $3,051.00.

RECEIPTS SLIGHTLY EXCEED EXPENDITURES

During the year 1938-39 the receipts of the Department amounted to $469,084.07, whereas, expenditures amounted to $463,555.03. Receipts exceeded expenditures by $5,529.04. In the fiscal year 1939-40 receipts amounted to $526,715.53, whereas, expenditures amounted to $526,460.90. Receipts were in excess of expenditures by $254.63.

For the biennium, the Department has received from inspection taxes, registration fees, etc., other than from the general fund a total of $995,799.60, and has spent a total of $989,456.32. Receipts for the year in excess of expenditures were $6,344.28.

These figures do not include any appropriations made by the General Assembly for Japanese Beetle Control, Bang's Disease Control, Credit Union, and Weights and Measures. They do include the expenditure of $26,350.00 for the Central Experiment Station, and $4,550.00 for seed improvement work, a total of $30,900.00, which this Department annually sends to the North Carolina State College.

From the above figures, you can see that the Department of Agriculture is spending its receipts and does not have any extra funds for further expansion of the program. In all probability the fertilizer tonnage for the next biennium will not equal that

of the past two years. If the tonnage should drop, there is a probability of our receipts for the next two years falling short of expenditures. In our opinion, the reserve in the agricultural fund is about as low as it should be.

ADDITIONAL FUNDS FOR EXPANSION

Additional funds are needed to expand the agricultural program. The Department of Agriculture cannot stand still. It will either go forward or backward. Certainly, we should go forward. Additional funds are needed for the following: Two additional feed and seed inspectors, six part-time fertilizer inspectors, one marketing specialist, secretary for Publicity Department, complete renovation of agricultural building, scientific equipment in the chemical laboratory, ventilating or cooling equipment in the nitrogen laboratory where temperature now reaches 130 degrees in the summer season and chemists must work under almost unbearable conditions; an agronomist in the Soil Testing Division to assist the director since the work of this division is rapidly expanding; two drug inspectors, however, they should, in our opinion, be paid from the general fund since they would render a service for the benefit of the entire State. Fertilizer and seed inspection taxes should not be used for services that are rendered the entire citizenship.

The Department, as well as State College officials, are recommending that a sufficient appropriation be made from the general fund for the North Carolina Experiment Station at State College, so that the $30,900 which the Station is now receiving from the Department funds may be retained. This will enable the Department of Agriculture to do those things which we have listed as most essential.

FERTILIZER, LIME, AND LAND PLASTER

Consumption of commercial fertilizers of North Carolina farmers reached its second highest level since the depression during the year ending June 30, 1939, the Department's tax tag sales showing a total of 1,208,934 tons. The tonnage for the fiscal year 1939-40 amounted to 1,084,725 tons, which is a reduction of 10.3 per cent from the fiscal year 1938-39. Total tonnage for the two years of the biennium amounted to 2,293,659 compared with 2,334,770 tons during the biennium ending June 30, 1938, which is a decrease of 1.76 per cent.

AGRICULTURAL LIME

During the biennium, there has been sold according to tax stamps a total of 99,923 tons of agricultural lime. This does not include lime furnished as Grant of Aid by the Agricultural Ad-

justment Administration or shipments to fertilizer manufacturers for mixing purposes.

A total of 74,657 tons of land plaster was used during the biennium.

In addition to the consumption of fertilizer, lime and land plaster, during the past two years, as indicated by the tax tag sales, there was quite a large tonnage of super phosphate or triple super phosphate and limestone delivered in many counties in the State for use in connection with the Federal Government Soil Conservation Program. Inspection tax is not paid on these materials supplied by the Federal Government on Grants of Aid. According to E. Y. Floyd, State Administrator of the Agricultural Adjustment Administration, the total tonnage of limestone during the biennium distributed by the AAA amounted to approximately 350,000 tons. If the Department of Agriculture had received the five cents per ton inspection tax on this lime, it would have amounted to $17,500.

FERTILIZER INSPECTION

Reasonable fertilizer inspection service has been provided during the past two years. During the peak season a total of twelve part-time inspectors actively covered their respective territories. An effort was made to get samples from every company in proportion to the tonnage sold. Our fertilizer inspectors made 8,403 inspections and secured 9,873 samples, aggregating 64,368 tons.

One sample of fertilizer was taken for approximately each 200 tons sold. In our opinion, more samples should be taken, at least one sample for each 100 tons sold. This will necessitate more inspectors as well as increased laboratory facilities.

FERTILIZER OF GOOD QUALITY

Reasonable quality in the fertilizer sold in the State is indicated by the fact that during the biennium, penalties were assessed on only 513 lots of fertilizer of 9,818 official samples analyzed and reported, which is only 5%.

If our inspection figures are indicative of the fertilizer movement as a whole, this means that 95 tons of every one hundred tons of fertilizer sold in the State either meet the guaranteed analysis or were found within the variations allowed by the fertilizer law.

$1,500,081 EXCESS PLANT FOOD

A study of the average value of fertilizer for the years 1938 and 1939 reveals that manufacturers gave North Carolina farmers an average of 67½ cents per ton value in excess of plant

food guaranteed or an excess of plant food value during these two years of $1,500,081.

These facts substantiate the value of rigid enforcement of regulatory measures, and indicate the protection given the farmers as well as the manufacturers.

The Department invites farmers to request inspectors to take special samples; in fact, more farm samples are being sought.

TRUCK MOVEMENT OF FERTILIZER

For some years now the transportation of fertilizer has been undergoing a change, and the movement by truck in small lots from the factory to the barn, and even to the field, has grown by leaps and bounds. In the face of this situation, which is growing more difficult to overcome from an inspectional standpoint, it is felt that the results accomplished by the inspectors in the field point to alertness and commendable activity on their part.

SAMPLES SHOULD BE SECURED AT THE FARM

By precedent and in the interest of economy and efficiency, most of our fertilizer samples have been secured at the dealer's warehouse, but there are some objections to this practice. If the "dealer sample" is found deficient, he is called upon to furnish the Department with the name and address of the users of that lot of fertilizer, which in most cases he is unable to do. Therefore, the user of the deficient lot of fertilizer fails to receive the penalty to which he is entitled. The only way to correct this situation is to employ a sufficient number of inspectors to get the samples from the farmer, the actual user of the fertilizer. This is being done in Georgia and South Carolina. The Department needs funds sufficient to employ short-time inspectors so that it can have an inspector for every two or three counties.

FEED SALES AND INSPECTION

Computed from the sale of tax tags and stamps, there were 725,867 tons of feed sold in the State during the biennium compared with 571,110 tons for the previous biennium, an increase of 154,757 tons.

According to the sale of tax tags and stamps, there were 180,434 tons of cottonseed meal sold in the State during the biennium compared with 237,228 tons for the previous biennium, which represents a loss of 56,794 tons of cottonseed meal in the two years' time.

In our opinion, the decrease of 56,794 tons in the sale of cottonseed meal is due to an increased use of soybean and peanut meal, which is reflected in the 154,757 tons increase of commercial

feed. If cottonseed meal is counted as feed, a net gain in total feed of 97,958 tons will be shown for the biennium.

From all sections of the State, the inspectors have collected 3,126 samples of mixed feed. A reasonable number of samples were sought from each company and extra precaution taken to secure samples of brands previously found below guarantee.

During the biennium, a total of 21,548 bags of feed were withdrawn from sale for various violations of the feed law, and the registration of seven brands were canceled. Three hundred and fifty-nine (359) lots of feed have been seized and held for satisfactory adjustment. Where the violations were of a technical nature, the feed was released for sale after the law had been complied with; however, 2,162 bags were returned to the manufacturer, 384 bags to North Carolina mills, and 1,778 bags to out-of-state mills. Penalties amounting to $595.23 have been assessed during the bienium to cover the cost of feed seizures.

Using the Department's analyses, both chemical and microscopic, as an index, the feed sold in this state during the biennium is far superior to that of the previous one. Anyone can now buy feed with reasonable assurance that it will contain the guaranteed ingredients and that the chemical analysis will equal the guarantee. Feeds are now branded so that the least informed farmer should not be deceived. Much progress has been made in the feed control program, but there is still considerable room for improvement. The minimum for any essential organic ingredients should probably be limited to 3% or sixty pounds per ton; also, the maximum fiber in dairy feeds should probably be 12 or 14%

SEED INSPECTION

The Department's four or five seed inspectors have done an excellent job during the biennium. They have regularly called on each known person engaged in the sale of seed, and have collected a total of 2,648 official samples of seed.

These inspectors have had to spend much of their time in collecting the $1.00 inspection stamps required on packaged seed. In our opinion, this provision of the seed law should be strengthened so as to require the wholesale shipper to affix these stamps; otherwise, repeal this provision of the law. We believe it undesirable to have the seed dealers to look on our inspectors as peddlers of stamps or revenue collectors. This, in our opinion, partially defeats the constructive seed control program that has been launched.

It is most important that the seed inspection service be increased by the addition of at least two inspectors.

An amendment to the seed law by the General Assembly provided for a $1.00 license to sell seed up to $100 gross value which

has resulted in an annual decrease of around $5,000 in revenue from seed dealers' licenses. Otherwise, this amendment has proven satisfactory.

A total of 540 lots of seed have been seized and withdrawn from sale during the biennium.

The Federal Seed Act, which became effective February 1, 1940, will be of much assistance in the enforcement of the State law.

FERTILIZER GRADE REDUCTION PROGRAM

During the spring of 1938, there were 202 different grades of fertilizer being sold to our farmers. During this biennium, a program has been launched to reduce the number of grades of fertilizer and to increase the plant food per ton.

GRADE REDUCTION CONFERENCE

A Grade Reduction Conference was called October 21, 1938. Farmers, agronomists, manufacturers, and fertilizer dealers attended this conference, and unanimously voted in favor of a grade reduction program. A committee was appointed and agreed on 22 different grades that would meet all requirements. This list, however, did not include some of the most popular grades such as 3-8-3.

THIRTY-EIGHT GRADES ADOPTED

Taking one of the most progressive steps in two decades, the fertilizer manufacturers agreed on the 22 recommended grades, adding only 16 other grades they believed necessary to meet the popular demand. This program has resulted in an increased use of the grades recommended by the North Carolina Experiment Station. Last year 96.6 per cent of the fertilizer used was of the thirty-eight approved grades with 42% of the total tonnage of grades recommended by the Experiment Station. We regret to report that the remaining 3.4 per cent represented 137 grades. These unnecessary grades should in some manner be eliminated from the market. In Mississippi and Louisiana it has been done by regulation. The Department is earnestly seeking the cooperation of the fertilizer manufacturers in eliminating these unnecessary grades. County agents and vocational agricultural teachers can be of much assistance by urging farmers to use only those grades recommended by the Experiment Station rather than some unusual or unheard of grade.

UNIFORM FERTILIZER LAW

In the interest of economy, efficiency and simplification of manufacture, inspection, and control, a program has been launched by the Department of Agriculture looking toward adoption of a uniform fertilizer law for the Carolinas, Virginia, and Georgia. The agricultural conditions in these states are so similar that a uniform fertilizer law is certainly expedient. Conferences have been held with manufacturers, agronomists, experiment station workers, and control officials of these four states. Proposed guarantees and penalty provisions have been agreed upon. Amendments bringing the North Carolina fertilizer law in line with these proposals will be submitted to the 1941 General Assembly.

One of the most important items in these amendments will be a proposal to increase the minimum plant food from fourteen to sixteen units per ton; thereby, eliminating such low analysis fertilizers as 3-8-3, 2-8-4, 2-9-3 and 0-10-4. These are uneconomical grades; in fact, they belong to the "horse and buggy days."

DERELICT FERTILIZER FUNDS

During the biennium, there has been collected as an imprest fund $2,141.44. These are derelict funds paid into the Department by fertilizer manufacturers when we are unable to locate the actual user of the fertilizer. Under the Escheats law, these funds, if not claimed at the end of five years, will revert to the University of North Carolina.

In our opinion, a provision should be made in the fertilizer law whereby such funds could be used by the Department to pay the expenses of bringing outstanding agricultural speakers to the State for special meetings such as field days at the branch experiment stations, farmers' conventions and other special farm meetings.

SUMMARY OF INSPECTION WORK

Table showing activity of inspectors in the inspection of fertilizer, feed and seed during the biennium, July 1, 1938-June 30, 1940.

FERTILIZER

Number of official samples taken	9,818
Number of tons sampled	64,368
Number of lots seized for various violations	110
Number of bags seized for various violations	6,972
Number of penalties assessed	513
Aggregate amount of penalties assessed	$ 6,708.79

FEED

Number of feed inspections	18,914
Number of tons sampled	5,271
Number of official samples taken by inspectors	2,788
Number of bags represented by samples	105,421
Number of miscellaneous samples	284
Total number of samples analyzed	3,327
Number of seizures for various violations	359
Number of bags seized for various violations	21,548
Number of bags returned to mills	2,162
Number of registrations canceled	7
Aggregate amount of penalties assessed	$ 595.23

SEED

Total number of seed inspections	13,793
Official samples (drawn by inspectors)	2,648
Individual samples	21,154
Total number of samples analyzed	23,802
Lots withdrawn for violation of revenue provisions	323
Lots withdrawn on account of poor quality	59
Lots withdrawn for relabeling	158

PUBLICATIONS DIVISION

LOUIS H. WILSON

Accurate and concise news stories have been furnished the newspapers of North Carolina with sufficient regularity to keep the taxpayers and other citizens of the State informed of the activities of the State Department of Agriculture.

Commissioner of Agriculture W. Kerr Scott and the heads of the 16 divisions of the Department have been conscientious and coöperative in furnishing information for news releases designed to better acquaint the public with the regulatory, inspectional and service work available to farmers and others.

The newspapers and press associations of the State have rendered invaluable service to the public by presenting agricultural information useful in building a better rural life and a more enlightened farm population.

In presenting all news stories, the Publications Division has attempted to be unbiased and mindful of the fact that readers and the press desire helpful information as well as accounts of the "stewardship" of all units of the Department of Agriculture.

A continued expansion of the services of all divisions of the Department has necessitated an enlargement of the publications work. Special information or stories for press associations, newspapers and agricultural publications have been furnished promptly upon request.

Newspapers: The Publications Division has been operated as a news bureau, offering the daily press "news when it is news". A weekly news service is also offered.

Press Associations: Feature articles, current or "spot" news, advance releases on addresses and events, crop reports and statistical information as background for stories are furnished with regularity to the Associated Press, United Press and Association of Afternoon Dailies. A weekly newspaper story on some phase of the Department is prepared by the Publications Division and presented as a farm page feature by the Associated Press.

Agricultural Review: This publication is the official organ of the State Department of Agriculture and is sent twice-a-month to any citizen upon request.

There are now 29,000 names on the mailing list for the "Review". More than 10,000 names were added during the past biennium.

In addition to furnishing subscribers timely information of value, tables have been printed giving information on low analysis and incorrectly labeled feeds, adulterated and misbranded foods, and mislabeled seeds.

A marketing service is also offered farmers through the want-ad section of the "Review".

Bulletins: Improvements have been made in bulletins issued by the Department, including the addition of suitable illustrations, more comprehensive indexing. Specialists have attempted to present bulletin material in such a manner as to "give the greatest good to the greatest number".

Pictures: Picture coverage for agricultural events is being furnished newspapers and magazines. Services of the Publications Division have been offered to newspapers and Press Associations in presenting agricultural information. Special picture assignments have been given prompt attention.

Radio: Material for special radio programs has been prepared and arrangements for broadcasting special events have been made during the biennium. The United Press has been furnished stories for "newscasts". Radio Stations WPTF and WRAL and other stations have made outstanding contributions in furnishing agricultural information to their listeners.

Information: Requests for agricultural information have been handled promptly by the Publications Division or referred to other divisions when necessary. When information requested is not available through the Department, letters and inquiries are sent to the proper organization.

State Fair: Newspaper and radio publicity for the State Fair has been handled through the Publications Division since the Fair was taken over by the State Department of Agriculture in 1937. Newspapers and press associations have readily accepted stories on the agricultural, educational and industrial features of the Fair. Agricultural leaders, State officials and others have termed the Fairs presented by the Department "outstanding agricultural and educational successes."

Editorial writers throughout the State have been generous in commending the present Administration in connection with the regulatory, inspectional and control programs offered "for the benefit of the farmers as well as the honest dealers or manufacturers".

DIVISION OF CHEMISTRY

B. W. KILGORE

The work of the Division of Chemistry of the Department covers a large and important list of materials in the field of agriculture, and in general. Specifically enumerated these are fertilizers and fertilizer materials furnishing food for plants, commercial feeds for livestock and poultry, human foods and drugs, insecticides and fungicides for combating insect and fungus diseases of plants and the analyses of quite a large number of materials of a general agricultural nature. For the purpose of discussion and reporting, these may be considered under the following heads:

FERTILIZERS

Official Fertilizers	9,818
Fertilizers and Fertilizer Materials for farmers	359
Official Feeds	2,788
Miscellaneous Feeds	539
Cottonseed Meals	12
Official Limes and Land Plaster	5
Miscellaneous Limes and Marls	528
Fungicides and Insecticides	132
	14,181

Fertilizers, fertilizer materials, feeds, cotton seed meals, insecticides and fungicides and materials of a general nature have been analyzed and reports rendered on them during the biennium. The analyses of these products have shown the goods put on the market in this State to be generally of a good quality and what they were claimed to be. The determination of acidity or basicity of fertilizers in addition to the regular analyses as made heretofore has given good results which have been helpful to our farmers. Determination of magnesia in fertilizers gives helpful information to the farmer who is carefully studying his soil and the requirements of the crops he grows for the different kinds of plant foods.

COMMERCIAL FEEDS

During the biennium a total of 3,327 samples were analyzed by the feed laboratory. Of these 2,788 were official samples taken by our feed inspectors. The other samples (539) were sent in by users of the feeds.

All samples were analyzed promptly upon reaching the laboratory and a report of each analysis was sent to the manufacturer and to the dealer.

Those samples which failed to comply with their guarantees were reported to the office of the Commissioner of Agriculture for appropriate action.

A law regulating the sale of canned dog foods was enacted at the last session of the General Assembly and many different brands of such canned dog foods have already been analyzed both chemically and microscopically by the feed laboratory. A considerable improvement in the qualities of these products has been noted.

Microscopical analyses continue to be a regular part of the work of the feed laboratory and each sample is examined in this way in addition to the regular chemical analyses. This means that each feed found on sale in this State is checked in every particular through chemical analyses and microscopical examination.

INSECTICIDES AND FUNGICIDES

There has been considerable increase in the amount of work on insecticides and fungicides as the number of these products have increased and are assuming more importance each year for combating insect and fungus diseases of crops. It is being found more and more necessary to consider carefully the materials entering into these products from the standpoint of their usefulness and effectiveness in destroying insect and fungus life.

FOODS

As the New Food, Drug and Cosmetic Act, passed by the Legislature of 1939, did not become effective until January 1, 1940, the food and drug work of the biennium, 1938-1940, was largely under the old Pure Food and Drug Act.

In the enforcement of these laws during the biennium special effort was made to make both the manufacturers and the consuming public "food law conscious." In carrying out the work along this line, there were four main objectives, viz:

(1) To prevent the sale of adulterated, misbranded and worthless goods found on the market.

(2) To assist manufacturers and dealers in properly labeling and representing their products.

(3) To assist canners in bringing their products up to U. S. Standard Grade.

(4) To see that food producing plants were kept clean and sanitary.

During the biennium the following samples were received and analyzed:

Bleached Flour	710
Ice Cream	633
Flavoring Products	745
Hamburger and Sausage	336
Vegetables, canned	241
Fruits, canned	58
Coffee	88
Herring Roe	42
Fish and Oysters, canned	39
Oleomargarine	30
Mayonnaise and Salad Dressing	34
Bakery Products	35
Bottled Drinks	85
Jams, Jellies and Preserves	32
Vinegar	18
Miscellaneous	337
Unofficial	556
Total	4,019

Inspections were made as follows:

	Number of Plants	*Number of Inspections*
Bakeries	164	986
Bottling Plants	241	1,067
Creameries and Ice Cream Plants	229	1,367
Total	634	3,420
Inspection of Canneries: Vegetable, Fish and Fish Roe		135
Total number of inspections		3,555

FLAVORING EXTRACTS

To eliminate many spurious or worthless flavors which flooded the markets, regulations, definitions and standards of classification for all flavoring extracts and flavors were adopted by the Board of Agriculture under authority provided by the State Pure Food and Drug Law.

Seven hundred and forty-five samples of flavoring products were obtained and analyzed, a large number of which were found to be offered for sale in violation of the law. More than thirteen thousand bottles of so-called flavoring products in bottles varying in size from three ounces to one pint were withdrawn from sale for the following reasons: misbranded, net contents not stated, adulterated in that they were too low in flavoring strength, and in a few instances of imitation lemon flavorings, glycol, a poisonous substance, was found. In the case of misbranding and net contents not stated opportunity was given to correct the labels or to ship the product back to the manufacturer. In instances where the product had little or no flavoring value, with the con-

sent of the retail dealer, the goods were destroyed. More than six hundred bottles of such goods were destroyed.

DAMAGED GOODS

Three grocery stores with large stocks of groceries were damaged by fire to the extent that it was thought advisable to withdraw all goods from sale pending official inspection. After inspection, that part of each stock not too badly damaged for human consumption was released for sale for that purpose; that part too badly damaged for human food but which could be used for animal feed was denatured and permitted to be sold for animal feed only; that part too badly damaged for either human food or for feed purposes for animals was turned over to the city health authorities to be destroyed.

In addition to fire damaged goods, due to spoilage from dust, dirt, insect infestation, decomposition from age, rusting of cans or other causes which rendered the products unfit for human food, the following were withdrawn from sale and either destroyed or permitted to be sold for hog feed only:

Herring Roe	120 cases of 24 cans each
Cut String Beans	15 cases of 24 cans each
Infested Peas unfit for human consumption	1,091 lbs.
Peanuts	375 lbs.

CANNED GOODS

A survey of canned fruits and vegetables on the market in North Carolina showed that about two-thirds of these products were below U. S. Standard Grade, due to short weight or slack fill or the failure to consist of whole or large pieces. A limited amount of spoilage was found due to insufficient processing or to being kept too long under unfavorable conditions, and in a few instances objectionable foreign matter was in evidence.

A survey was also made of the canneries operating within the State with the view of helping the operators to bring their canned products up to U. S. Standard Grade. Whenever insanitary conditions were found such facts were pointed out and recommendations made for improving such conditions. Great improvement was made along this line. This work was in conjunction with Federal authorities with the view of adopting standards and regulations under the new Food, Drug and Cosmetic Act.

MEATS

Three hundred and thirty-six samples of hamburger and sausage were obtained from different sections of the State and tested for chemical preservatives. A large number of these samples were taken from places that previously had violated the

food law in the sale of ground meats adulterated with added sulphites, and which places had been warned that future violations would be reported to the courts. As a result of this investigation, it was found necessary to draw indictments in nineteen cases involving seventeen firms and individuals, a conviction being obtained in each instance.

MISCELLANEOUS SAMPLES, POISONS, ETC.

Of the five hundred and fifty-six unofficial samples received more than half of them were for suspected poisons or other harmful foreign substances. These samples consisted largely of foods, and beverages for human consumption; animal and poultry feeds; viscera and other specimens from animal bodies. Most of these samples were submitted by city and county officials, physicians, and farmers who could not otherwise account for the death of their poultry or stock and suspected either intentional or accidental poisoning. Poisons and foreign substances were found in a considerable number of these samples.

DEFINITIONS AND STANDARDS FOR ICE CREAM

In April 1940, revised definitions and standards of identity for frozen desserts were adopted by the Board of Agriculture under authority granted by the North Carolina Food, Drug and Cosmetic Act. Inspection and systematic grading of ice cream plants under the Ice Cream Plant Inspection Law were continued during the biennium. Forty-nine plants which did not score the required grade were closed, some voluntarily. A large per cent of plants so closed remodeled their buildings and installed new machinery or otherwise brought their buildings and equipment up to requirements. After this had been done, inspections by agents of this Department were made, and, if satisfactory conditions were found to exist, such places were permitted to reopen. A few plants which could not be brought within the requirements of the law were permanently closed.

An intensive drive was made to clear up the condition of almost general misbranding of dairy products. This drive has resulted in the elimination of by far the greater part of the misbranding heretofore prevailing. In addition to direct contacts with the industry, the work was carried on in conjunction with the manufacturers of cartons and other containers who voluntarily agreed to work with the Department and to sell no merchandise which failed to comply with the labeling requirements for food products.

BOTTLED DRINKS

Following a number of conferences with officials of the North Carolina Bottlers' Association, regulations acceptable to both the

bottlers and this Department were formulated, and regulations for the sanitary operation of plants manufacturing bottled carbonated soft drinks, also regulations on the representation and labeling of carbonated and still beverages advertised or offered for sale in North Carolina were adopted by the Board of Agriculture under the Food, Drug and Cosmetic Act. A satisfactory and workable scoring system for grading the sanitary condition of bottling plants was also put into effect.

NEW FOOD, DRUG AND COSMETIC LAW

Perhaps the most important and far reaching achievement along the lines of food work in North Carolina during the past several years, as regards sanitation and prevention of adulteration and misrepresentation, was the adoption of the new Food, Drug and Cosmetic Act by the General Assembly of 1939. The new law also regulates advertising of foods, drugs, cosmetics and devices. It is a long step forward in that it corrects most of the defects of the old law and renders state legislation uniform with federal legislation on the subject.

The drafting of general regulations for the effective enforcement of the North Carolina Food, Drug and Cosmetic Act has been virtually completed. The formulation of definitions and standards of identity, quality and fill of container has been, and will continue to be an almost endless task, due to the scope of the undertaking and to the changes which are taking place in the production of food products. To acquire the information prerequisite to reaching intelligent and reasonable conclusions requires considerable time and study, which time has accordingly been given to the consideration of these problems.

Chemists in the laboratories, the inspectors in the field and the workers in the office have performed their duties most agreeably, satisfactorily and efficiently, and for this they have our sincere appreciation.

DIVISION OF ENTOMOLOGY

C. H. Brannon

This Division respectfully submits the following report for the past biennium:

Duties

The Division of Entomology is engaged in regulatory and law enforcement work in connection with plant pests. It is also charged with the responsibility of enforcement of the N. C. Bee Disease law. This Division coöperates with the U. S. Bureau of Entomology and Plant Quarantine in White Pine Blister Rust Prevention, Phony Peach Disease eradication and Japanese Beetle quarantine, trapping, and soil treatment.

Valuable work in connection with its excellent insect collection and records, covering a period of over 40 years, is also a major activity.

The largest project of the Division of Entomology is the annual inspection of all North Carolina nurseries. This exacting work requires the full time efforts of two of our staff, Mr. J. A. Harris and Dr. D. L. Wray, during July, August and September. Nurseries which are in good condition and apparently free from dangerous plant pests are issued a State Certificate which expires September 30, of the following year. The North Carolina certificate of Nursery Inspection is accepted by all States and the Federal Government. 200 nursery certificates were issued in 1938-39 and 193 nursery certificates were issued in 1939-40. Certificates are granted only after the inspection fee is paid.

The nursery certificate fees are as follows:

Three acres or less	$ 5.00
Four to ten acres	7.50
Eleven to fifteen acres	10.00
Sixteen acres	12.50
Each additional acre	.10

Native Plant Collectors Permit

An annual fee of $10.00 is required for a permit to collect and ship native plants including boxwood. Approximately 35 such permits are issued each year.

Nursery Dealer Certificate

The annual nursery dealer certificate fee is $10.00. This applies to stores or individuals. Approximately 30 such certificates are issued annually. A bond of $1000 is required of all who promise (orally or written) later attention to the Stock sold.

APIARY INSPECTION

The following report has been submitted by the State Apiary Inspector, P. G. Graddock, who is engaged in conducting the State bee disease control program and enforcing the state bee disease laws and regulations which give protection to the beekeepers of the state.

In June 1938 the State Board of Agriculture and the Commissioner of Agriculture acting under authority granted to them by the State legislature revised the state apiary inspection regulations, and designated all of the state east of Highway U. S. No. 1 as a clean up area in which intensive work should be done for the purpose of controlling and, if possible, eradicating American foulbrood, the most dreaded of all bee diseases. Since June 1938 the major part of the inspection work has been done east of U. S. Highway No. 1, but some time has been spent in the rest of the state. Colonies have been inspected in most of the Piedmont and mountain counties in order to locate and eradicate diseased colonies when possible.

In the clean-up area the number of colonies of bees found infected with American foulbrood has been steadily decreasing, and with the continued support and coöperation of the beekeepers it is thought that the disease can eventually be practically eradicated in this area. Constant inspecting and checking of bees in this section will continue to be necessary in order that new outbreaks of disease may be located and cleaned up before they spread.

Definite progress has been made in conrtolling and eradicating disease in the Piedmont where for the most part it is found in scattered localities around cities and towns. Some of the outbreaks have been eradicated and others greatly reduced during the past two years. Much of the inspection in the Piedmont and mountain counties has been done in coöperation with the County Farm Agents.

From July 1, 1938 to June 30, 1939,—10,035 colonies of bees were inspected and 148 colonies or 1.5% were found infected with American foulbrood. Fourteen certificates for queen rearing were granted during the year.

From July 1, 1939 to June 30, 1940,—12,048 colonies of bees were inspected and 141 colonies or 1.2% were found infected with American foulbrood. Eleven certificates for queen rearing were granted during the year.

Several apiaries were inspected for beekeepers who reside in the northern states but who keep bees in North Carolina for the purpose of supplying bees to their northern yards. These bees were all found to be free from disease.

Burning is the method used in disposing of colonies infected with American foulbrood.

European foulbrood, a disease which affects primarily the black race of bees, is widely scattered over North Carolina. The best control for European foulbrood is to requeen the infected colonies with either Italian, Caucasian or Carnolian queens, as these races of bees are resistant to the disease. No quarantine regulations have been put into effect to control this disease but considerable time has been spent acquainting beekeepers with the nature and control of this disease.

A summer assistant is greatly needed in this work in order to facilitate eradication of bee diseases. North Carolina is fortunate in having undertaken this work before the whole state had become heavily infected. If intensive work can be expanded in western North Carolina there is a good chance of effective control of bee diseases for the entire state.

INSECT TAXONOMY

Dr. C. S. Brimley, one of the ablest minds in the field of entomology and natural history in general, in the United States, has charge of this important work. Dr. Brimley looks after one of the finest insect collections in the country which he has largely developed. The Division collection runs now well over 75,000 specimens representing more than 10,000 different species. This great collection with its records is of inestimable value to the State and is put to practical use every day in the identification of insect pests from all over the State. The collection and records are constantly consulted by workers in the State and by many from other states.

BLISTER RUST PREVENTION

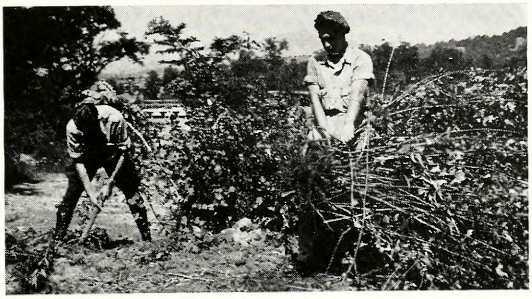
It should be pointed out that this important program is *preventive.* The dreaded White Pine Blister Rust disease has *not yet* been found in North Carolina. It is causing enormous damage in many parts of the United States and is found in the State of Virginia. North Carolina has seen the wisdom of not waiting until the disease gained entrance to start action, and the results of the fine work under way should make it difficult for the disease to gain entrance into North Carolina.

The following report has been submitted by H. B. Teague, of the U. S. Bureau of Entomology and Plant Quarantine, who is State Leader in charge of the project:

During the biennium ending June 30, 1940 white pine blister rust control work was continued in Western North Carolina with 17 white pine growing counties receiving protection or being partially worked. The program, begun in 1934, has continued the destruction of Currant and Gooseberry bushes (Ribes) to prevent

the spread of white pine blister rust to the white pines of North Carolina.

Blister rust, a fungus disease, produces spores both on five-needle pines and on currant and gooseberry leaves. The spores produced on diseased white pines in the spring are not capable of infecting other white pines; but can, infect the leaves of currant and gooseberry bushes.



REMOVING CURRANT AND GOOSEBERRY BUSHES IN WESTERN NORTH CAROLINA. (U. S. D. A.)

In late summer and early fall diseased currant and gooseberry leaves produce spores that are capable of infecting white pine trees. After trees are infected, the disease keeps spreading until the tree is killed.

The following counties were worked, some being completed while others were still being worked at the end of this biennium:

Avery
Buncombe
Burke
Caldwell
Cherokee
Clay
Graham
Haywood
Jackson
Macon
Madison
McDowell
Mitchell
Polk
Swain
Transylvania
Yancey

Work during this period has been financed largely by W.P.A. funds supplemented by funds or workers supplied by the State Department of Agriculture, U. S. Department of Agriculture, National Park and National Forest Services with C.C.C. labor, N.Y.A. office workers, and Private owner coöperation.

An average of more than 100 workers and 3 field supervisors were employed. W.P.A. furnished 85, N.Y.A. 4, C.C.C. 12 during the summer months, the State 2, and one owner 4 for one week. Actual and technical supervision was furnished by field supervisors, State and Regional leaders, the State Entomologist, W.P.A. and U. S. Bureau of Entomology officials.

TRANSPORTATION

Nearly all transportation was furnished by Government trucks owned by the Bureau of Entomology and Plant Quarantine with the exception of C.C.C. workers. A total of 15 trucks were in operation most of the time. Transportation costs were borne by W.P.A. State and the U. S. Department of Agriculture with C.C.C. supplying trucks and money for transporting C.C.C. crews.

PREERADICATION SURVEY

Several counties with only cultivated currant and gooseberry bushes were mapped by the "Spot" method of mapping. This system is merely a non-detailed survey with the general pine areas spotted on county maps as nearly to scale as the mapper can do without running a compass survey.

In the winter of 1938-1939 a new system of surveying white pine areas was begun in those counties having wild (or native) gooseberries in the white pine growing sections. This method is called the grid system and is carried out on units of area one mile square. The units are established by the use of compass and chain and posts are placed at each corner of the square; with a temporary stake, numbered, being placed every 5 chains on the North and South grid boundary lines.

Each square mile unit is then type-mapped by a crew of 2 or 3 men to show timber types and gooseberry and currant locations.

A summary of Preeradication Survey work follows:

PREERADICATION SURVEY

	Federal W.P.A.	State W.P.A.	State Dept. of Agriculture	Total
Number of Counties	10	5	2	17
Acerage of White Pine Mapped:				
Over 50 trees per acre	71,231	22,767	1,288	95,286
Under 50 trees per acre	42,844	10,363	537	53,744
Total White Pine acreage	114,075	33,130	1,825	149,030
White pine acerage plus protective zone	239,684	69,460	7,526	316,670
Total Man hours used	46,493	78,637	926	126,056

RIBES ERADICATION

Currant and gooseberry bushes were eradicated from white pine areas on lands owned by the National Forest Service, National Park Service, City, County and individuals.

Agencies doing the work were State, W.P.A. and C.C.C.

The following table summarizes eradication work for the two years.

	C.C.C.	Federal W.P.A.	State W.P.A.	State Dept. of Agriculture	Total
Average number of men used	13	19	29	2	63
Total man hours	9,026	42,452	36,145	381	88,004
Acreage worked	409	174,335	64,710	6,597	246,051
Wild Ribes eradicated	75,029	287,180	138,252	2,919	503,380
Cultivated Ribes eradicated	86	17,412	884	106	18,488

CHECKING

Two types of checking were carried out:

1. Checking in gardens, at house sites, and other places where cultivated bushes had been eradicated previously. This checking was not done at all places previously having bushes; but enough places were checked to show that previous work has been good but that some sprouts are coming back at a few places. The cultivated checking needs to be carried out in all areas by 1945 to prevent the sprouts getting too large and spreading.

2. In all sections worked which had native (wild) Ribes a systematic checking program was carried out by running strip lines 5 chains apart. This gave a 5% check on all acreage involved. Areas or parts of areas found to have more than 25 feet of live stem of gooseberry bushes per acre were reworked. It is essential to eliminate as many leaf producing bushes as possible to prevent a concentration of blister rust spores in the pine areas. All areas are worked until the live gooseberry stems per acre are reduced to less than 25 linear feet.

The strip checks made covered 1613 strip acres and a total of 3066 labor man hours was used.

ECONOMIC IMPORTANCE OF WHITE PINE

From an economic viewpoint white pine in North Carolina is placed in two groups:

1. Ornamental trees.

2. Native and planted stands being grown for commercial purposes.

One ordinarily thinks of values of trees in terms of the saleable value for wood or lumber. However, white pine has been used very extensively in Western North Carolina as an ornamental tree, and this is particularly evident in the Asheville-Biltmore, Hendersonville, Flat Rock, Blowing Rock, Roaring Gap and other tourist resorts. Value of the commercial white pine in the state is estimated at more than $10,000,000; and ornamental trees have been evaluated as follows:

Trees less than 2 inches D. B. H.	$ 4.00 each
Trees 2″-6″ D. B. H.	20.00 each
Trees 6″-12″ D. B. H.	40.00 each
Trees 12″ D. B. H. and over	60.00 each

On the basis of the above figures the value of ornamental white pines in North Carolina is placed at more than $25,000,000.

COSTS

The cost of blister rust control work during the past two years is as follows:

Federal W.P.A.	$ 43,641.02
North Carolina Department of Agriculture	9,782.11
U. S. Department of Agriculture, Regular	270.89
N.Y.A.	1,721.71
C. C.C.	3,070.15
State W.P.A.	40,039.84
Coöperative Services	5,383.58
	$103,909.30

JAPANESE BEETLE WORK

QUARANTINE

The Japanese Beetle Quarantine is maintained in coöperation with the U. S. Bureau of Entomology and Plant Quarantine. C. H. Hill, of our staff is located at Greensboro and has charge of the quarantine enforcement. Mr. Hill also aids in scouting, trapping, soil treatment and other activities of this Division.

The following report was submitted by Mr. Hill:

JAPANESE BEETLE QUARANTINE

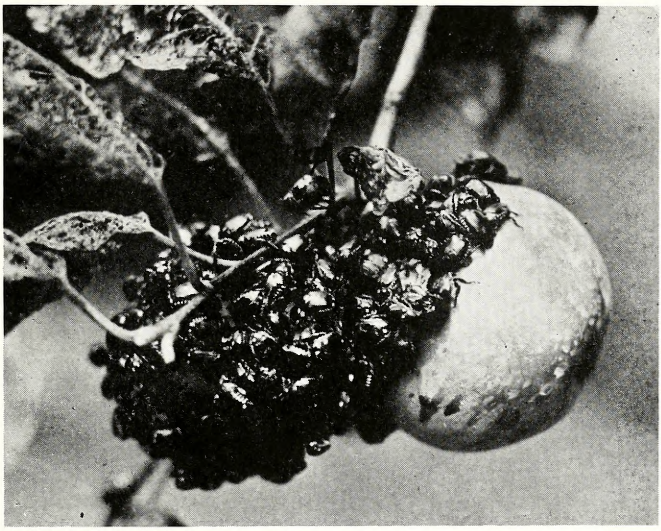
The Japanese Beetle Quarantine includes townships in the vicinity of Charlotte, Greensboro, East Spencer, Spencer, Salisbury, and Winston-Salem. No nursery, ornamental, or greenhouse stock, or other plants, plant roots, or sand, soil, earth, peat, compost, or manure, can be transported in any manner from the quarantined area without a special Japanese Beetle permit to show that the shipment has been inspected and is apparently free of Japanese Beetle larvae.

This quarantine operates on a coöperative basis between The North Carolina Department of Agriculture and The U. S. Department of Agriculture. C. H. Hill is in charge of enforcing the quarantine, under the supervision of the State Entomologist, and Mr. E. A. McKnight, Agent, U. S. Bureau of Entomology and Plant Quarantine of the Richmond Office.

During June and July of 1938 and 1939 forty-four nursery and greenhouse establishments in and in the vicinity of the quarantined area were inspected two or three times each of these

seasons by state and federal inspectors. These establishments had a total of 420,770 square feet under glass and 387.25 acres of outside stock.

Nursery and greenhouse operators, and dealers, after proper inspection, are able to get, without cost, special Japanese Beetle certificates; one of which must accompany each shipment of quarantined material out of the quarantined area. From July 1, 1938 to June 30, 1939, 3,028 such certificates were used. From



JAPANESE BEETLES ATTACKING APPLE. (U. S. D. A.)

July 1, 1939 to June 30, 1940, 2,254 such certificates were used. All certificates are voided at the end of each month. Those not used must be returned along with a report of the shipments on which certificates were used.

TRAPPING

During June and July, 1939, approximately 10,000 Japanese Beetle traps were placed in North Carolina. The number of beetles caught were as follows: Asheville 1,071, Burlington 5, Charlotte 36, Durham 29, East Spencer 637, Elizabeth City 46, Goldsboro 3, Greensboro 335, Hamlet 1, High Point 37, Rocky Mount 10, Salisbury 30, Sanford 38, Spencer 377, Thomasville 2, Wilmington 90, Wilson 4, and Winston-Salem 1,188.

During June and July 1940 approximately 10,000 Japanese Beetle traps were again placed in the state. The results were as follows: Asheville 19,322, Burlington 34, Charlotte 37, Durham 58, East Spencer 985, Elizabeth City 29, Goldsboro 2, Greensboro

100, High Point 77, Lexington 8, Raleigh 33, Rocky Mount 12, Salisbury 87, Sanford 11, Spencer 157, Tarboro 1, Weldon 3, Wilmington 43, Wilson 3, and Winston-Salem 366.

Trapping is done in coöperation with the U. S. Bureau of Entomology and Plant Quarantine, and is the only practical method known to determine the early spread of the beetle. Quarantine and soil treatment is based upon the results of trapping. The traps are the property of the Federal Government and contain a chemical which attracts the Japanese Beetle.

Approximately $3500 from State funds were allocated for trapping each year of the biennium.

SOIL TREATMENT

Thru the wisdom and generosity of the last General Assembly an appropriation of $90,000 was made for soil treatment in Japanese Beetle control because of the threat of this dreaded pest to the agriculture of North Carolina. $65,000 of this fund has been expended and the additional $25,000 will be expended during the fall of 1940.

JAPANESE BEETLE SOIL TREATMENT.

Soil treatment consists in treating heavily infested areas with arsenate of lead to kill Japanese Beetle grubs in the soil. The Federal Government coöperates in furnishing large power sprayers necessary for the work together with personnel for handling the sprayers. Arsenate of lead and labor are furnished by the state.

The following treatments have been made with 1,000 pounds of arsenate of lead per acre:

SPRING 1939

Charlotte 6 acres, Durham 7, Elizabeth City 6, Greensboro 70, High Point 10, Raleigh 8, Sanford 10, Spencer 35, East Spencer 20, Wilmington 20, Winston-Salem 50.

FALL 1939

Burlington 7 acres, Charlotte 15, Durham 10, Elizabeth City 10, Goldsboro 4, Greensboro 53, High Point 24, Lexington 5, Raleigh 5, Rocky Mount 10, Salisbury 22, Sanford 4, Spencer 12, East Spencer 30, Wilmington 7, Wilson 6, Winston-Salem 76.

NARCISSUS BULB INSPECTION

J. A. Harris and D. L. Wray have done the inspection work on this project. All inspections in connection with this work are extremely tedious and exacting requiring long experience for proper handling. The spring field inspections are especially difficult because of the necessity of shading the plants with an umbrella in order to detect the slight discoloration indicative of nematode infestation.

The North Carolina bulb industry would have been forced out of business long ago if the careful supervision of this Division had not been maintained. Excellent coöperation is received from the growers.

During the storage inspection in 1938, 4,104 bushels of bulbs on 13 properties were inspected and certified as free from nematode and bulb fly. The hot water treatment was given 307 bushels which were found infested with nematode during spring inspections.

In the Spring of 1939, 134.1 acres of narcissus were inspected on 17 properties. One property was found infested and the infested bulbs were destroyed. During the 1939 storage inspection 7,010 bushels of bulbs were inspected on 14 properties and certified.

During the spring of 1940, 105.4 acres on 15 properties were inspected. Four of these properties were found infested with nematode. 1.92 acres were infested. Clean up and eradication measures were put in operation at once.

The bulb inspection fee is $5.00 for three acres or less, and $1.00 for each additional acre inspected. This fee is for the field inspection but also includes the storage inspection if bulbs are to be shipped.

PHONY PEACH ERADICATION

J. A. Harris is State Coöperator in charge of this project which is carried out in coöperation with the U. S. Bureau of En-

tomology and Plant Quarantine. D. L. Wray of our staff also works on this project.

During 1939 inspections were made in 13 counties. Only three counties were found infected: Anson, Robeson and Stanly. Inspections were made of the environs of 13 nurseries growing 473,168 peach trees. No infected trees were found in the nursery environs inspection. A total of 2,938 properties were inspected and 5 found to harbor diseased trees. 68,904 trees were inspected and 5 trees found infected. These were promptly removed.

COMPARISON OF 8-YEAR OLD HILEY PEACH TREES. PHONY, LEFT; NORMAL, RIGHT. (U. S. D. A.)

The entire state is now free from the quarantine with the exception of Anson, Robeson and Stanly counties, because of negative finds for the past three years.

During 1940 inspections were made on 1,514 properties including 16,417 trees in 3 counties. *No infections were found.*

This invaluable work was undertaken before it was too late. The peach industry of the state would have been ruined should phony disease have ever spread widely in North Carolina. The eradication work has apparently eliminated the disease. However inspections will be continued and if no disease is found during the next two years North Carolina will be declared free from the phony disease quarantine.

EUROPEAN CORN BORER

The European Corn Borer, a serious pest of corn and many other plants, was first found in North Carolina during 1939 on Knotts Island. J. A. Harris and D. L. Wray did the scouting work in connection with this infestation.

Scouting in October, 1939 gave the following results:

Camden County	3 fields infested
Currituck County	12 fields infested
Pasquotank County	1 field infested

Extensive scouting was also carried out in Chowan, Gates and Perquimans counties with no infestation being found.

Just what the future spread and damage from this insect will be in North Carolina is impossible to predict at this time.

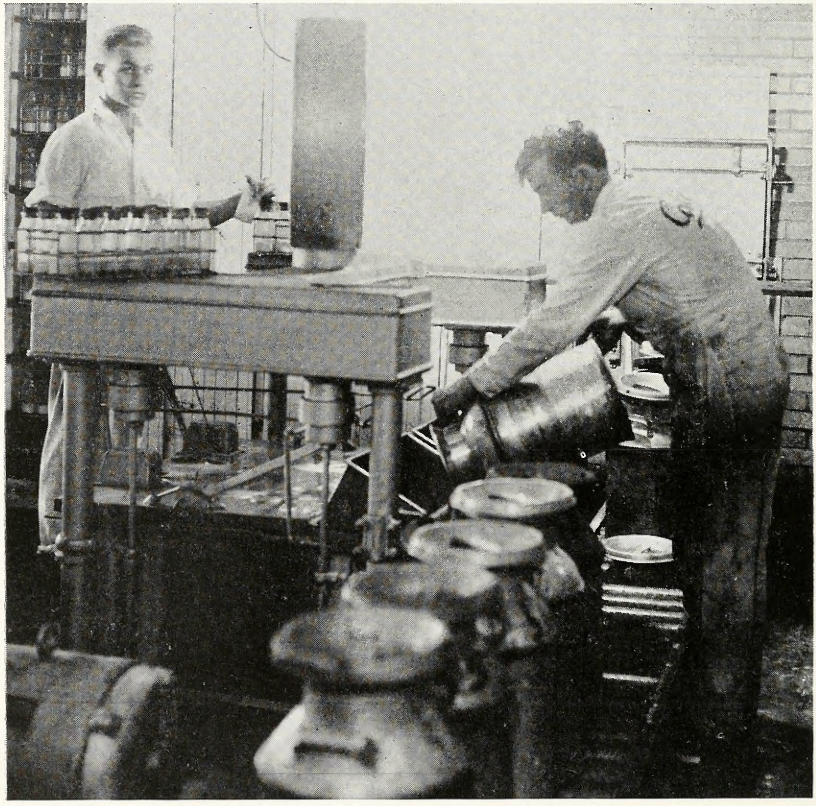
ACKNOWLEDGMENTS

I wish to again thank the Board and the Commissioner for their full support. I am delighted to commend the entire staff for their efficiency and loyalty and to thank the U. S. Bureau of Entomology and Plant Quarantine for their hearty coöperation with the Division.

DAIRY DIVISION

C. W. PEGRAM

The most important service rendered by the Dairy Division is the checking of butter-fat content of milk and cream sold by North Carolina dairy farmers. During the past biennium, check tests for butter-fat were made on approximately 25,000 samples, necessitating 1500 investigations. In addition to checking the work of licensed testers, the methods of sampling and weighing of milk and cream were supervised. Changes of personnel in dairy plants requires constant supervision and training. All testers must demonstrate their ability in actual practices before they are licensed.



SAMPLING AND WEIGHING MILK IN A MODERN PLANT.

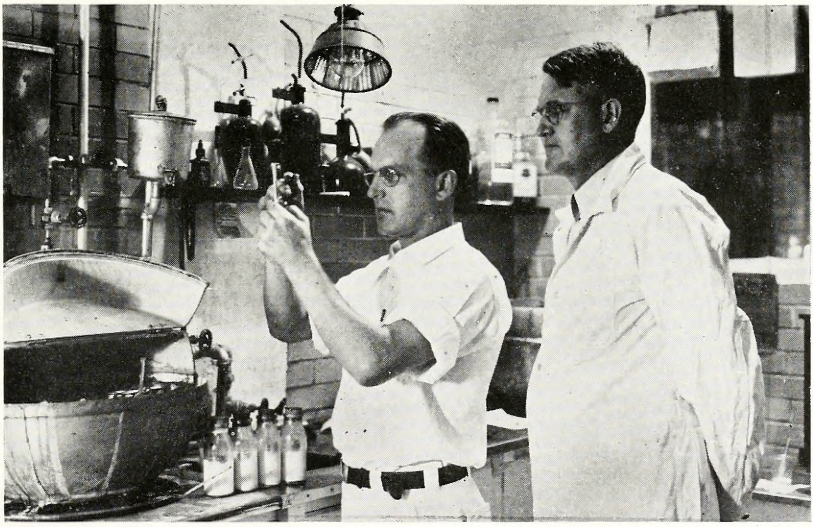
Scales and balances were checked for accuracy periodically in coöperation with the Division of Weights and Measures. A total

of 372 errors in butter-fat tests above the tolerance of two-tenth of one per cent were found. In all instances where such variations were found, the corrections were made by the licensed tester before payment was made to the producer, or an adjustment was made after regular payment was made.

Dairy plants have been consistently improving their testing laboratories. Nearly all plants use electric centrifuges which make for accuracy and convenience.

Stress has been placed upon the importance of sampling as to regularity, accuracy and preservation. All of these factors may affect very materially the resulting test.

More than 6000 reports were mailed to producers showing results of check tests made. This has made for standardization and the building of confidence between producer and buyer which is vital to the development of the dairy industry within the state.



CHECKING TESTS OF A LICENSED TESTER.

L. J. Martin of Lexington is shown on the left and C. W. Pegram, Chief of the Dairy Division of the Department of Agriculture is shown on the right.

DAIRY PRODUCTION STATISTICS LAW

The General Assembly of 1939 enacted a statute providing for the keeping of creamery and milk products records. This was a progressive step, making it possible to obtain accurate figures on the State's growing dairy industry. The dairy statistics are secured in coöperation with the Federal-State Crop Reporting Service. Listed below is the results secured for the year 1939:

Whole milk purchased by plants	100,955,354	Pounds
Whole milk sold for fluid consumption	61,306,517	Pounds
Creamery butter made	2,365,668	Pounds
Ice cream made (by plants)	3,477,311	Gallons
Ice cream made (Counter freezers)	173,453	Gallons
Total ice cream made	3,650,765	Gallons
Ice cream mix sold	285,423	Gallons
American cheese	427,502	Pounds
Cottage cheese	210,657	Pounds
Condensed skim milk	928,082	Pounds
Whole condensed milk	303,216	Pounds

The gross value of all milk and dairy products for 1939 was estimated by the Crop Reporting Service to be $37,540,000 which exceeded the 1939 cotton and cotton seed crop value by $11,233,000. The milk and cream sales by farmers amounting to $12,630,000. This ranks North Carolina as thirteenth among the states based on gross value. The average production per cow was 3900 pounds which shows a steady increase from year to year.

STATISTICAL REPORT—DAIRY DIVISION

Buying plants and stations supervised		65
Plant investigations		1,475
Special investigations		15
Check tests made	17,103	
Supervised tests made	6,931	
Sample tests	858	
Total		24,892
Tests found incorrect (changed)		372
Tests reports mailed to dairymen		6,371
Testers, weighers and samplers licenses issued annually		128
Cream haulers licenses issued annually		60
Licenses revoked		2
Milk and cream scales checked (In coöperation with Division of Weights and Measures)		122
Milk and cream scales condemned for repairs		29
Testing equipment condemned		10
Cream balances checked		35
Cream balances condemned for repairs		6
Pieces glassware calibrated		536
Pieces glassware condemned		9
Oleomargarine licenses issued (Wholesale dealers)		68
Oleomargarine inspections (Eating places)		665
Tester's examinations given		30

CREDIT UNION DIVISION

D. R. GRAHAM

The records of the Credit Union Division reveal that the citizens of North Carolina are rapidly becoming aware of the benefits to be derived from the credit union plan.

A credit union is a coöperative savings and loan association, having as its purpose (1) the promotion of thrift by providing for the membership an easy, convenient plan of saving and (2) from the savings thus accumulated taking care of the short term credit needs of the members. A credit union may be organized by any group having a common bond of association, occupation or residence.

During the biennium ending June 30, 1940, fifty credit unions were organized as follows: teachers, 3 white, 2 negro; business, professional and industrial, 33 white; rural community, 2 white, 6 negro; and urban community, 2 white and 2 negro. The following counties were represented: Buncombe 10, Orange 1, Mecklenburg 3, Tyrrell 1, Bladen 1, Gaston 2, Harnett 1, Durham 2, Guilford 4, Haywood 1, Catawba 1, Lenoir 1, Davidson 1, Granville 1, Wake 6, Hyde 1, Clay 1, Warren 1, New Hanover 1, Forsyth 9 and Caswell 1.

There are now 125 credit unions serving the people of North Carolina and inquiries received indicate that a considerable number will be organized within the near future.

Much time has been devoted to teaching members how to properly utilize credit union service and to the training of officers, directors and committeemen. Emphasis has been placed on supervision and the few irregularities that have been found have been readily straightened out. All credit unions have been examined at least twice during the biennium.

The condensed statement below shows that the 22,446 credit union members in North Carolina have accumulated savings in the aggregate amount of $1,593,380.89. Had credit union service not been available, a large part of this money would not have been saved.

During the period under review credit unions have made loans to their members in the total amount of $4,841,338.01, and it is reasonable to assume that thousands of dollars in interest charges have been saved. It is the consensus of all of those who are familiar with the plan that the State, through this service, is doing much to further the economic security of its citizens.

	June 30, 1938	*June 30, 1940*
Active Credit Unions	78	125
Total Members	12,343	22,466
Total Assets	$ 921,548.99	$ 1,593,380.89
Number of Loans Made Since Organization	51,281	89,463
Amount of Loans Made Since Organization	$5,863,366.66	$10,704,704.67

CONDENSED STATEMENT OF CREDIT UNIONS AS AT JUNE 30, 1940

RESOURCES

Loans to Members	$1,385,130.87
Cash on Hand and in Banks	146,629.76
Other Assets	61,620.26
	$1,593,380.89

LIABILITIES

Shares	$1,093,869.77
Deposits	302,732.79
Other Liabilities	49,692.35
Reserve (Guaranty Fund)	77,498.81
Surplus and Undivided Profits	69,587.17
	$1,593,380.89

DIVISION OF MARKETS

RANDAL B. ETHERIDGE

I herewith submit Biennial Report of the Division of Markets covering the period from July 1, 1938 through June 30, 1940.

With full recognition of the urgency for assistance to North Carolina farmers in securing more profitable distribution of their products, the Division of Markets has, during the biennium, expanded its services as far as financial support would permit. In addition to enhancements of previously established activities, four new projects were inaugurated and have been in operation during the past year. These are largely concerned with better preparation for market, standardization of grade and pack, and sales promotion of North Carolina farm commodities, including field crops, poultry and eggs, dairy products, and fruits and vegetables—thereby, greatly increasing the variety and scope of work which should prove beneficial in helping to increase the income of our farmers.

FIELD CROPS MARKETING WORK

A field crops marketing specialist has been laying the ground work for improved marketing conditions of lespedeza seed, small grains, peanuts, and commercial hays. On the basis of a study of more than 4,000 samples of lespedeza seed analyzed by the State Seed Laboratory, the official N. C. Grades for lespedeza seed were promulgated and became effective on November 10, 1939. These grades are now generally recognized and used by the seed trade in and out of the State and by producers of seed as standards of quality and as a basis for price adjustments. To tell the story of better marketing of lespedeza seed, a natural color moving picture was made. This picture, supplemented by discussions, was carried to 27 adult farmers' meetings during February and March of 1940, reaching approximately 2,000 producers.

The principal work in small grains has had to do with the condition of wheat as delivered to the mills. Members of the Piedmont Millers Association have coöperated in this project, and farmers have been advised in regard to the proper harvesting with combines, ways and means of increasing weight per bushel, the control of wild onion and weevil damage, and the market problems of small grains.

Attention has been given to the harvesting and preparation for market of peanuts. Better methods of harvesting, stacking, curing, and picking have been urged on the peanut growers.

The possibilities for profitable marketing of commercial hays grown in the State have been investigated to determine the

sources of supply and demand for lespedeza, soybean, cowpea, and peanut hays. Growers have been urged to harvest at the proper time, to cure, and to bale their hay in order to be better prepared to meet the customary market demands.

PROMOTION OF DAIRY PRODUCTS

A program formulated by the National Dairy Council was launched in the fall of 1939, designed to increase the consumption of milk and other dairy products in North Carolina as an aid to the dairy industry of the State, as well as to public health.

Where population and consumption would justify, the organization of permanent Dairy Council units was undertaken as the most effective means of establishing a higher level of milk consumption. Such a unit was put into operation for High Point and Greensboro. Later, Winston-Salem organized a council to serve Lexington and Mount Airy, also. The Raleigh-Durham Dairy Council and the Mebane Dairy Council had been previously established. Five meetings were held preliminary to the organization of the Greensboro Council and 25 were conducted to perfect the Winston-Salem organization.

For the purpose of explaining the program or to impress the value of using more milk and dairy products, 26 group meetings of teachers, business men, doctors, dentists, lawyers, parents, nurses, and homemakers were held, the total reached in this manner being 6,495. More than 1,030 contacts were made with members of the dairy industry, and 626 other individuals have been conferred with. Four fair exhibits in the interest of dairy products were prepared and were seen by 98,000 visitors. Two sound films on milk have been shown to approximately 5,000 children and 500 adults.

The foundation has been laid for far more effective work during the coming year. With the experience gained, it is the aim of this program to inform the people of North Carolina of the value of milk and dairy products, so that the present consumption will be materially increased.

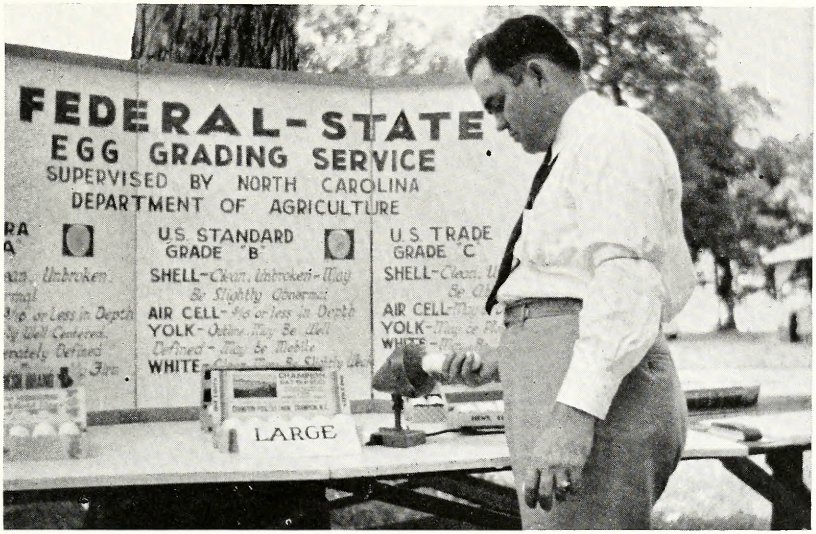
EGG LAW ENFORCEMENT AND POULTRY MARKETING

The Storage Egg Law, passed in 1939, was enforced for the first time during the fall and winter of 1939 and 1940. This law required that storage eggs be plainly labelled as such when offered for sale in this State.

Inspections were made in all of the principal towns of the State, the number of inspections in each town varying with the size of the town. In many cases, a number of visits were made to the same town in order that better compliance could be assured. In organizing this work, it was necessary to contact the wholesale

trade first and then the local and chain groceries. Numerous inspections were made without too much interruption of business, and the trade reacted very favorably to this work. No prosecutions were necessary and many indications have been received that the law has benefitted both the producers and the consumers.

The Federal-State Egg Grading Service supervision continues to require additional time. Inspectors at the various egg grading stations certified approximately 861,000 dozen eggs during the two year period, with the past year showing an increase of 130 per cent over the previous year.



RALPH KELLY, POULTRY AND EGG GRADING SPECIALIST OF THE STATE DEPARTMENT OF AGRICULTURE, IS SHOWN CANDLING EGGS, WHICH IS ANOTHER COÖPERATIVE SERVICE RENDERED BY THE DEPARTMENT'S MARKETS DIVISION.

Eleven official egg grading stations were operated during this period. In addition, egg grading was carried on by several firms on an official basis.

Numerous conferences were held with interested parties on marketing poultry and eggs as well as the grading of poultry and eggs. Demonstrations were conducted at all the State Test Farms and other places, such as fairs and poultry schools. Several competitive egg judging contests were held. The first of these contests between Vocational High Schools was staged with several schools participating.

Poultry dressing plants were furnished advisory service in securing and installing modern equipment. In one case, this resulted in the securing of about $3,000 worth of new equipment

which has doubled the output and shown a very satisfactory profit for the year. The improvement was the means of putting a superior product on the market, making sales easier and giving the public a cleaner, more attractive product.

The problem of relieving the surplus egg production during the spring and summer months has become more acute each year and resulted in the storage of approximately 350,000 dozen eggs in the past two years. Most of these eggs were graded before being placed in storage at Asheville and Raleigh, as well as at Richmond and Norfolk, Virginia.

FRUIT AND VEGETABLE MARKETING

More active promotion of modern and adequate methods of attracting more profitable distribution of North Carolina fruits and vegetables was begun in the fall of 1939. Since the plight of the commercial early potato grower appeared most critical, a major portion of time and effort was devoted to this crop last year. An intensive program for rehabilitation of the industry was developed in coöperation with the United States Department of Agriculture, the State College Extension Service, the N. C. Produce Growers Coöperative Association, Incorporated, and commercial interests.

MORE THAN 3,000 FARMERS VISITED THE COÖPERATIVE POTATO TRAIN WHICH TOURED EASTERN NORTH CAROLINA CARRYING SPECIALISTS AND DISPLAYS CONTRIBUTING TO THE REHABILITATION OF THE COMMERCIAL IRISH POTATO INDUSTRY.

This began with a series of nine grower meetings throughout the producing areas for consideration of the problems affecting the situation. Support of railroads and other agencies was enlisted in the operation of a Potato Demonstration Train, consisting of five cars which made 10 stops in the potato sections and was visited by about 3,000 producers. By exhibits, demonstrations, talks, moving pictures, and distribution of educational material, much interest was aroused in the approved practices of production, harvesting, handling, grading, washing, drying, packing, loading, and shipping of potatoes. Special emphasis was placed on the correction of carriage troubles which menaced so seriously the value of North Carolina potatoes in the terminal markets during recent years.

Detailed specific recommendations for improvement of the potato industry in North Carolina were prepared and over 4,000 copies were distributed among commercial growers and shippers. Four regional meetings were held to consider needed adjustments in rail traffic regulations and a report of conclusions was prepared. Work with the railroads resulted in elimination of the $5.50 charge for use of dry refrigerator cars for Irish potatoes; reduction of the minimum car weight from 30,000 to 24,000 pounds in the interest of better carriage and wider distribution; and revision of some train schedules and diversion provisions to expedite terminal deliveries.

Mr. H. A. Spilman, in charge of administering the Perishable Agricultural Commodities Act, came to the State for three meetings with shippers for explanation and discussion of the provisions of the Act. The development and location of sixteen potato washing and drying equipment installations in North Carolina this season were assisted. The adoption of two uniform master brands for potatoes—"Chief Manteo" at Elizabeth City and "General Wayne" at Mount Olive—was secured.

The First Annual Potato Tour of the State was conducted, through coöperation with the State College Extension Service, Experiment Station and the Federal Department, for first-hand field study of new and approved developments in the industry. The potato market news and stabilization clearing house at Washington, North Carolina, operated during the harvest period by Mr. A. E. Mercker of the Federal Department, was given personal assistance. The support of shippers was secured in group advertising of North Carolina potatoes to the wholesale trade. The fact that the combined efforts in behalf of the potato producers resulted in definite progress toward better conditions is generally attested to by receivers in consuming markets.

A circular, "What, When and Where of North Carolina Fruits and Vegetables," for the purpose of attracting more buyers was

compiled and 2,000 copies were distributed among potential wholesale purchasers. Plans were developed for State authorized labeling for identification of top quality, officially inspected farm products as a means of stimulating consumer acceptance and premium prices. Specialists were assigned to the Western North Carolina produce section to work with growers and shippers in improving the quality and pack of apples and vegetables from that district. Members of the Division worked in coöperation with the Farm Agent of New Hanover County with considerable success in the establishment of new State outlets for produce from that section. The North Carolina Division of the Georgia-Carolinas Peach Marketing Board was assisted in raising funds for continuation of a nationwide merchandising campaign.

SHIPPING POINT INSPECTION SERVICE

The largest single project of the Division of Markets is the point of origin inspection and certification as to grade of fruits and vegetables for shipment out of North Carolina. This work, carried on in coöperation with the Agricultural Marketing Service, is available to growers and shippers on a self-supporting, voluntary basis. The fees paid by users are required to support this service. The inspectors are licensed by the Federal Department and act in a neutral capacity in describing the quality and condition and certifying as to the grade of a commodity. A major portion of the produce shipped from North Carolina is bought and sold on the basis of grade as determined by the inspectors. The voluntary use of this service proves its value to the growers and shippers, especially in the sight-unseen selling of their products.

A total of 7,595,111 packages, equivalent to 21,330 carloads, of produce was certified as to grade during this period. The commodities included Irish potatoes, sweet potatoes, peaches, strawberries, apples, tomatoes, watermelons, cantaloupes, peas, snap and lima beans, green corn, cabbage, cucumbers, peppers, lettuce, beets, carrots, squash, dewberries, huckleberries, mixed vegetables, peanuts, and soybeans.

During the peak shipping season, this service required a trained personnel of one hundred and thirty-five licensed inspectors. The temporary employment of that many qualified men, to see that they are properly trained, equipped and supervised, makes necessary a great amount of detailed planning for months in advance. This force normally falls into three different groups, each of which is qualified by training and experience to inspect certain, specific commodities in which they specialize. The setting up of 65 temporary field offices is required to handle this work at shipping points in all the principal producing areas of the State.

A regulation was passed by the Board of Agriculture requiring that potatoes offered for seed purposes in North Carolina meet the specifications of U. S. Grade 1 or be plainly marked "not graded." Three specialists were employed during the time of arrival of seed potatoes in the State to enforce the provision and safeguard seed supplies. They made themselves available to the growers and receivers without cost and, in many cases, were responsible for warning growers and dealers against inferior seed stocks. In some cases, hidden defects discovered by these inspectors would have resulted in very poor production had the seed been planted. Dry type of freezing injury and excessive sprouting, both of which weaken seed materially, were the most prevalent causes for complaint.

The watermelon marketing agreement, with compulsory inspection, continued through the 1939 season, but was suspended in 1940. No material effect was seen in the volume of inspections made between the compulsory and voluntary use of the service, as growers realized the benefits derived from inspection and continued to avail themselves of grade certification. With the assignment of five men for inspection work on peas at the new auction market in Elizabeth City, the volume jumped from 61,201 bushels which was the previous biennium to 140,730 bushels for this period, or more than doubled. For the first time a specialist of the inspection service was placed in New Hanover County to assist growers of lettuce and other truck crops on a voluntary basis. Foundation work was started there on grading and packing and much of this inspector's time was given gratis to growers and shippers in an effort to improve the quality of produce offered for sale from that section. Another first for this service was the placement of an inspector at one of the larger apple orchards at Waynesville for a period of eight weeks. In addition to certifying for grade 21,330 bushels of apples, this inspector devoted his spare time to working with other growers in the preparation of their products for market.

Inspectional work on Farmer's stock peanuts was renewed and 13,429 bags were certified as to grade for the Roanoke Mutual Association. Inspection of soybeans was continued at Elizabeth City, and, during this period, 16,820 bushels were certified for grade.

DESTINATION OF INSPECTION SERVICE

Inspection, upon arrival at destination, is made at the request of receivers of commodities shipped into the State in order to determine the condition and grade. This kind of inspection normally is called for only when the product is thought to be below contract specifications, and it is used as the basis for adjustments in the price originally agreed upon by the shipper and receiver.

Members of the Division made inspection of twenty-seven cars of inbound produce at various receiving points for the purpose as outlined.

STABILIZATION AND STANDARDIZATION

For the past two years, the Irish potato stabilization clearing house at Washington, North Carolina, operated during the harvest period by Mr. A. E. Mercker, of the Agricultural Adjustment Administration, has been continued. This work starts ahead of planting in the dissemination of outlook information tending to stabilize acreage and discourage over-planting when necessary. At shipping time, the growers and shippers are kept in close contact with the facts and figures influencing marketing of the crop in an effort to maintain orderly movement and uniformity of price. The personal assistance of members of the Division has been rendered this work.

The Peanut Stabilization Coöperative was again assisted in its diversion program. Approximately 5,000 tons of surplus North Carolina peanuts were purchased, stored and crushed for oil with favorable effect on market prices. These purchases were made on the basis of grade determined by inspectors licensed by the U. S. and North Carolina Departments of Agriculture.

A TYPICAL STRAWBERRY AUCTION MARKET IS SHOWN ABOVE. BUYERS ARE MAKING THEIR PURCHASES ON THE BASIS OF U. S. GRADES WHICH WERE DETERMINED BY THE COÖPERATIVE INSPECTION SERVICE OF THE DEPARTMENT OF AGRICULTURE.

Strawberry standardization work has been underway for a number of years and was given added impetus by the assignment of three full time specialists to this program, along with the available time of the forty-five inspectors working strawberries. The increased returns to growers who packed their berries according

L. P. WELLS OF MT. OLIVE IS ONE OF THE MANY STRAWBERRY GROWERS IS EASTERN NORTH CAROLINA WHO HAS BENEFITTED BY USING APPROVED METHODS FOR PACKING BERRIES. THE TYPE OF PACK SHOWN ABOVE HAS BEEN CITED AS A MODEL BY THE MARKETS DIVISION OF THE DEPARTMENT OF AGRICULTURE.

to approved specifications were quite notable and gained recognition on all the strawberry auction markets. Work of similar nature has been done successfully on most of the fruit and vegetable crops in the State by specialists and inspectors of the Division of Markets. Considerable improvement has been made in the quality, condition and pack, which strongly influences prices, of a number of commodities. These activities have been tied in rather closely with the inspection service.

SURPLUS COMMODITY PURCHASES

During the marketing periods of this biennium, surpluses developed on Irish potatoes, sweet potatoes, cabbage and snap beans for which no profitable sales could be found through regular channels. In each of these cases a substantial measure of relief was secured by appeal to the former Federal Surplus Commodities Corporation, or the more recent Surplus Marketing Administration, which came to the rescue. These purchases for removal of demoralizing surpluses, which tended to bolster crashing prices, saved growers from serious losses. Full support of the Division of Markets has been accorded the institution and prosecution of these programs. The surplus purchases have always been made on the basis of certification as to grade made by members of the inspection service who also assumed a number of responsibilities in accomplishing the helpful removal.

NEW PRODUCE MARKETS

Some assistance has been given to local groups who were interested in developing more adequate markets. In the cases of Elizabeth City and Clinton, help was given in planning set-ups for auctions which have been functioning for two years and one year respectively. These required several meetings, as well as further information on the establishment of their scale of charges, method of conducting the auction and the designing of plans for the buildings. The Elizabeth City market has sold mostly early peas. The Clinton auction, operating for two months during the 1940 season, handled approximately a quarter million packages of beans, peas, corn, squash, huckleberries, dewberries, cucumbers, peppers and tomatoes and proved highly successful. Much work has been done with the idea of establishing wholesale jobbing markets for farm products in Raleigh and Smithfield which would be designed to serve a wide territory for both receiving and distributing.

TOBACCO STANDARDIZATION

Tobacco, providing the largest source of farm income in North Carolina, has been given a considerable amount of specialized marketing attention by the Division. Through a coöperative agreement with the Agricultural Marketing Service, the demonstration work in tobacco standardization has been expanded in the past two years. Demonstrations in proper sorting, tying, and better preparation of tobacco for market have been featured in an extensive series of meetings. With a total farmer attendance of 3,849, demonstrations have been held in 36 counties of the State in coöperation with local farm agents. Night adult classes

have been held in 23 schools with an attendance of 682, in coöperation with vocational teachers. Tobacco standardization has also been demonstrated in the vocaitonal departments of 70 high schools to 2,367 agricultural students.

HELPING FARMERS TO GRADE AND BETTER PREPARE THEIR TOBACCO FOR MARKET IS A SERVICE RENDERED BY THE STATE DEPARTMENT OF AGRICULTURE. W. P. HEDRICK (EXTREME RIGHT), TOBACCO MARKETING SPECIALIST, IS SHOWN DISCUSSING GRADES WITH A FARMER.

Assistance was given Burley growers in Northwestern North Carolina in the establishment of a market at Boone. This new market has been highly beneficial to the growers in that area. Demonstrations were held in 15 Burley-growing counties with a total attendance of 2,145 tobacco farmers. The county agents arranged these meetings.

Due to the continued changes in demand for tobacco products, manufacturers have been contacted often and helpful information acquired. This information passed on to the growers has enabled them to better prepare their tobacco for market to meet the demands of the buyers.

LIVESTOCK MARKETING

The livestock grading and marketing program instituted in 1937 was continued, and improvements and expansions deemed expedient were made.

A total of 8,837 lambs were graded, and, with the coöperation of State College Extension Service, were marketed coöperatively for a net return of $52,794.94 for the 500 farmers served. The animals originated in Alleghany, Ashe, Camden, Currituck, Pitt, Tyrrell, and Watauga Counties, and a substantial saving was effected in the marketing of these lambs. New York is the principal and the highest priced lamb market in the United States; and in selling North Carolina lambs in this market, they must first be assembled in carload lots. Ownership can not be pooled satisfactorily unless the lambs are graded so that the owners may receive returns commensurate with the quality of the lambs they include in the pool. The grading demonstrates the type of lamb that farmers can best afford to produce for the market, which renders market news more understandable and makes sight unseen trading possible.

FARMERS OF WESTERN NORTH CAROLINA "POOL" THEIR LAMBS FOR GRADING BEFORE THEY ARE SOLD ON NORTHERN MARKETS. THIS PROGRAM HAS BEEN CONDUCTED BY THE STATE DEPARTMENT OF AGRICULTURE'S MARKETS DIVISION IN COÖPERATION WITH STATE COLLEGE EXTENSION SPECIALISTS.

A bulletin listing feeder cattle for sale in the counties of Alleghany, Ashe, Avery, Buncombe, Haywood, Mitchell, Madison, Yancey, and Watauga Counties was issued in the fall of 1939. A total of 15,000 cattle belonging to 650 farmers was listed. Around 2,000 copies of this bulletin were distributed among prospective customers in North Carolina and in nearby states. This marketing project brought a number of new feeder cattle customers to the farmers of western North Carolina and enabled them to market their cattle more profitably. It also established closer relationships between the cattle feeders of the eastern section and the producers in the grazing area of western North Carolina.

Grading assistance was rendered for the livestock auction in Asheville. Aid was provided for the promotion and establishment of a grading and trading terminal station for feeder cattle in Asheville. Grading assistance by Department representatives was arranged for the fall of 1940. It is believed that this pooling and private sales arrangement will be of material assistance to the cattle producers of western North Carolina, as well as to feeders operating in eastern North Carolina.

A moving picture showing services rendered by freezer locker plants was assembled and shown to various promotional, education, and business groups throughout the State. The freezer locker plant is destined to become more widely used in North Carolina. Such plants make available an economical supply of palatable meats to farmer families throughout the year, and, in addition, step up the efficiency of livestock marketing. The Department was instrumental in securing a Federal Grant to establish one of these plants in West Jefferson, North Carolina.

Information showing the cost of erecting and operating a meat packing plant was assembled for the Charlotte Chamber of Commerce, and a detailed report showing balance sheets and operating statements was submitted. The marketing specialist was made available for use in leading livestock marketing discussions arranged by teachers of vocational agriculture. A number of such meetings were held and were well attended. It is expected that demands of this nature will be of even greater number in the future.

MARKET NEWS SERVICE

North Carolina producers, buyers, and sellers are provided daily with accurate and unbiased market news from both the permanent Raleigh office and seasonal temporary field offices, the objective of which is "orderdly marketing by facilitating and equalizing distribution and the discouraging of the dissemination of fictitious and misleading market information by biased sources."

For nearly three years, this information has been made available each market day to the general public. Though the service is now usually taken for granted, it has become an indispensable factor in the American system of marketing. Reliable market news is now practically a necessity in the operations and plans of everyone who produces, buys, or sells. The basic information is collected in many ways; by interviews, telegraphic reports, warehousemen, inspectors, and by numerous contacts with other groups.

To distribute the information in time to be of practical use, the Raleigh office is directly connected with the United States Department of Agriculture, Agricultural Marketing Service's leased

wire system of more than 7,500 miles (airline) or leased telephone wires. As the information is received in Raleigh, it is decoded and edited and distributed by mail, radio, and press.

Farmers can not market intelligently unless they know the market values of their products. Neither can they be on an equal bargaining basis if they are not familiar with prices being paid in the various price setting markets. With that thought in mind, we have endeavored to make available to the farmers of North Carolina market information that would place them on an equal basis with any section of the United States.

Seasonal daily mimeographed reports, in coöperation with the Agricultural Marketing Service, are issued from temporary field offices at Chadbourn, Washington, and Hamlet, North Carolina. In addition, the Raleigh office releases daily and weekly press, radio, and mimeograph reports on cotton, tobacco, feedstuffs, peanuts, poultry and eggs, dairy products, livestock, and fruits and vegetables. Also, for the producer who is not operating in the market throughout the season, weekly and monthly reviews and summaries are available. The reports issued at Chadbourn dealt with strawberries; those at Washington with commercial early potatoes; and the ones from Hamlet with peaches and watermelons.

Field reports issued showed the total U. S. carlot shipments by States; primary destinations and Potomac yard's passings of North Carolina shipments; and North Carolina and competitive f.o.b. prices. Too, telegraphic reports were received and disseminated from the principal wholesale terminal markets. These telegrams included the factors that influence market adjustments and wholesale sales.

Market information, developed early in 1938 and expanded during the biennium, is disseminated by mail to 3,000 North Carolina farmers each week and daily by nine radio stations, five daily newspapers, and the two press associations. Mail reports are issued to poultry and egg, cattle, hog, sheep and lamb, and apple producers while the radio and press releases cover the major agricultural commodities.

The furnishing of daily and weekly price reports on tobacco, in coöperation with the Agricultural Marketing Service, according to grade is also an activity of the Division. Information on the grade of tobacco is of little value to the grower unless he is provided simultaneously with information on the average selling prices of the various grades. With specific information on grade, and the equally specific information on price, the grower is able to arrive at the approximate value and can decide whether to accept or reject the auction bid.

MUTUAL AND COÖPERATIVE ORGANIZATIONS

Much work has been done with mutual and coöperative associations in the last two years. In compliance with the law governing them, their annual reports have been received and filed; suggestions designed to benefit their organizations in a business way have been made; and assistance in more efficient operation has been given. It was found that many organizations needed changes in their set-up, and they were rendered assistance in amending their charters, by-laws, and marketing agreements. Fourteen new associations have been incorporated. The charters, by-laws, and marketing agreements for many of these associations have been prepared by representatives of the Division of Markets. The dairy organizations found it necessary to borrow money to build and equip their plants. The Columbia Bank for Coöperatives at Columbia, South Carolina, furnished a source for such loans, provided the coöperative was properly formed and their business practices were approved. Valuable assistance has been given in making applications in proper form and further help in following through to the final securing of these loans. Two more such arrangements have been started.

MOVING PICTURES ON MARKETING

The use of moving pictures as a means of encouraging approved marketing methods was inaugurated during the past year. The following 16 mm. Kodachrome film subjects have been produced: "Lespedeza as a Seed Crop in North Carolina," "A Tar Heel Potato Pleads His Case," "Freezer Lockers and Custom Meat Curing in North Carolina," "Tar Heel Strawberries March On," and "Creating Consumer Preference for Tar Heel Vegetables." Other films are in the process of making on soybeans, lambs, tobacco, peaches, hays and other commodities; and several suitable film subjects, mostly with sound, have been acquired from outside sources. These pictures have been used to carry the message of modern marketing practices visually to thousands of farmers in meetings throughout the State. They have been made available for various farm group meetings and vocational agricultural classes in rural high schools.

MISCELLANEOUS SERVICES

Numerous other occasional activities of the Division of Markets do not logically fall under the headings already outlined. A few of these will suffice to convey some idea of their nature. Representatives of the Division attended and assisted various meetings of commodity societies interested in bettering marketing conditions. Two meetings were attended in Washington, D. C., regarding the Wage and Hour Law as it affects North Carolina

strawberry growers, and much information was assembled for the Federal Wage and Hour Administration. The Resettlement Administration was furnished information on the migratory harvest labor situation in this State. A summary of municipal ordinances regulating itinerant merchant truckers of farm products was furnished for a survey by the Bureau of Agricultural Economics. An investigation was made of the local marketing needs of communities throughout the State. A conference was attended in Atlanta, Georgia, to consider a proposal of the railroads to accept inspection records in lieu of weighing on all cars of watermelons from the Southern States. Members of the Division participated in a number of meetings called by groups concerned with marketing problems of peculiar interest to their localities. Assistance and advice was rendered to a large number of individuals on specific phases of marketing.

PERSONNEL OF THE DIVISION

The increase in value and scope of marketing activities during the biennium has necessitated an enlargement of personnel. The marketing specialists have been carefully selected for ability, training, and practical experience in this vital field of agriculture. It has been a matter of pride that both the permanent and temporary employees have demonstrated unusual qualifications in their lines. Their harmonious, loyal, and enthusiastic services have made for effective accomplishments.

ACKNOWLEDGMENTS

In conclusion, I wish to acknowledge your sympathetic interest and support in the work of the Division of Markets. It has been a pleasure to collaborate with branches of the United States Department of Agriculture with whom coöperative agreements have been operated, the State College Extension Service and Experiment Station with whom we have had joint projects, and all others who have contributed to our programs. Particular appreciation is expressed to the county agents and vocational agricultural teachers, who have frequently rendered valuable assistance in accomplishments of the Division.

DIVISION OF STATE MUSEUM

HARRY T. DAVIS

Objectives: Presentation of our Natural History and Natural Resources to the State and out-of-State visitors has continued as our major function during the past biennium. All exhibits have been improved as such and new exhibits have been added in our Halls for Fossils, Rocks, Minerals, Forestry, American Indian, Fishes and Marine Life, Birds, Mammals, and Agriculture. The public response to this has been encouraging.

Accessions: This is given in summary and indicates the large number of specimens which come to or are collected by an active Museum. For obvious reasons all accessions do not become good exhibits, but we make use of most of them and the detailed records make up a body of useful information. Because of brevity this report carries acknowledgment of only major accessions.

Accessions by groups were:

Fossils	52
Rocks and Minerals	140
Forestry and Botany	16
American Indian	316
Invertebrates	34
Fishes	43
Reptiles	87
Birds	198
Mammals	40
Agriculture	46
Books	72
Pictures	39
Lantern Slides	33
Total	1,116

Exhibits: The most notable collection of fossil specimens was made at a W.P.A. built sewage disposal pit near Stantonsburg. Hundreds of pounds of whale bone fragments along with shark and crocodile teeth and juniper wood came from this pit. Most of the rocks and minerals were species and varieties and for localities new to this Museum. Remarkable was a fulgurite collected on an ancient Indian village site at Collington. This is a sand tube fused by lightning.

Working with the University Laboratory of Archaeology, most of our American Indian material is sent to Chapel Hill. In turn we have their aid in building related educational exhibits. Notable burial urns on exhibit have come to us thru Mrs. O. C. Bruton, Mrs. George W. Little and Mrs. Chas. T. Pate. A notable soapstone vessel came from the late Dr. James A. Wray.

The two most notable additions to our fish exhibits have been a 75 pound Channel Bass from Ocracoke, by Fred Stedman, and a 594 pound Blue Marlin which was taken off Cape Hatteras by Marshall Dana on rod and reel. Both of these are records for the United States east coast and the latter was secured thru Tom Eaton. Other fish that were new records for North Carolina are a thirty-five pound Long-finned Albacore, a Rudder Fish and a Wahoo. New to our exhibits are a three foot Angel Shark, and a 58 pound Sail-fish.

Among reptiles our live poisonous snakes in Hall I continue to be a major attraction carrying the knowledge of our native poisonous snakes. New mounts of non-poisonous species have been added.

In Bird exhibits we added the firsts for North Carolina; in Glossy Ibis—by Clyde Mason—in Great Black-backed Gulls—by Sam Walker—and in Greater Shearwater and Audubon's Shearwater—by Mart Fulcher.

Other birds new to our exhibits or skin collection are: Roseate Tern, Western Willet, Western Sandpiper, Sharp-tailed Sparrow, Seaside Sparrow, Black Tern and Cory's Shearwater. The larger number of the birds received were used to build up our study and reference collection of skins, which is now one of the best in the southeast. Bird students and college classes are making greater use of these. The reconstruction and relighting of a large habitat group of Water Turkey, Osprey and Cormorant in our Bird Hall has been a noteworthy improvement.

Our most notable addition to mammals was a female seventeen foot Beaked Whale which was stranded on the Gull Shoal Beach, Hatteras Island. This is a small whale which is quite rare. What was more unusual this female carried a well developed foetus, seven feet long. As exhibits we are preparing to show the mother and unborn young as well as the complete skeleton. Ben Dixon McNeill and the C.C.C. Camp at Manteo aided in securing these.

In the Hall devoted to Agriculture we added interesting old home and farm implements. More useful were a series of tobacco and egg samples with labels to explain the basis of grading of these products. These were prepared with the Marketing Division. The suggestion is in order that other Divisions of the Department might well consider presentation of some of their work thru the Museum.

Much needed books have been added to our working library—in part thru donations—and other valuable publications from Museums and as subscriptions. Comparatively few pictures were added, but we greatly need more of these to clarify and publicize our exhibits. The lantern slides are principally of fishes, and we

plan some of other subjects in order that we may better present our work to outside groups.

Mrs. Thomas O'Berry presented us twenty-one valuable water-color paintings of native Flowers. These were painted by Gene Erwin and Frances Durant under the E.R.A. Art Project.

One modern museum case was added and it indicates clearly what improvement can be made in exhibits. New fluorescent lighting was designed and installed in a few of our cases and the result is better light and more light. Our labels are being progressively improved at low cost by using a small printing machine which was purchased jointly with the Hall of History.

Publications: Some thirty thousand copies of what we call our Information Circular have been distributed during the biennium. This is an inexpensive mimeographed paper of one to three pinned sheets. Most of these have been taken by Museum visitors, but hundreds of copies have been mailed out in answer to definite requests from our schools. By request of the Department of Education most of these were first printed in the Public School Bulletin, resulting in cards and letters from teachers and pupils asking for more copies.

We secured as a gift from the estate of the late Dr. John Warren Achorn a large number of colored plates of native birds from the book "A Guide To The Winter Birds Of The North Carolina Sandhills." In response to an insistent demand from our schools some 200 twelve page sets of these were labelled and put together and sent to teachers.

H. H. Brimley of our staff, with Drs. T. Gilbert Pearson, C. S. Brimley, and John Grey, has devoted considerable effort to preparing the data and copy for a revised edition of the book "Birds of North Carolina." Further progress on this awaits the results of some research by the Smithsonian Institution. Drs. Ben Royal, and F. H. Craighill are also assisting with bird records.

Attendance: Our visitors continue at the rate of better than 200,000 per year. As noted before, we have no attendant to make complete counts, but sample counts justify this figure. More school groups and classes come to work on special subjects. The State has a large investment in this Museum. Given these exhibits it is logical that they be available to the public for maximum hours. We continue the voluntary practice of having the Museum open on Saturday afternoons and on all Holidays except Christmas. The public response to this is good except for very cold days when we have no heat. We again recommend that arrangements be made to open the Museum on Sunday afternoons, omitting mid-winter when no heat is available. This is modern museum practice.

Coöperative Work: We continue as co-sponsor with the University and other institutions for the W.P.A. Archaeological Project now operating. Approximately $200,000.00, has been set up for research into the mode of life of the American Indians who lived in our area. The writer is chairman of the Advisory Committee for the University.

We have worked closely with the Historical Commission in connection with their Museum—across the street—and have purchased and used jointly a small printing machine. W.P.A. has furnished a young man to operate this for printing labels and other items.

To the Visual Aid work of the University we have furnished color prints of pictures from the book on Birds of our Sandhills and these were mounted and made available to our schools.

The Art Society is gradually moving their collection from our Hall V which frees space for our Indian exhibits. For the U. S. Wild-Life and Fisheries Service the writer banded some 800 beach birds in 1940. We continue to render assistance in many ways to the Bird Clubs of North Carolina.

The N. Y. Worlds Fair Exhibit for this State was under the Department of Conservation, but the Museum supplied some polished stone spheres and large wooden bowls for the exhibit. This was renewed for 1940 and the Museum loaned more material for it thru State College.

From N.Y.A. we have received aid for our guide service and clerical assistance. This was discontinued in June 1940, and we are now trying to arrange—with the Hall of History—a comprehensive W.P.A. Museums Project which should prove to be very helpful.

The Museum staff has been assigned the task of organizing and executing plans for the exhibits to portray the work of the Department at the State Fair. While such exhibits have not always been most satisfactory they have been creditable considering the material available.

Building: With new buildings completed about the Capitol ours does not present a good appearance by comparison. More important than appearance is the fire hazard we face. Our exhibits accumulated over a number of years, represent several thousand dollars of State investment. Much of the material cannot be replaced at any cost. Aside from this hazard, which needs consideration, the Salisbury Street entrance of the Museum should be remodeled for the convenience of our visitors.

A more serious problem with us for some time now is the fact that our hand-operated freight elevator was condemned by the State Inspector in May, 1940. This is a serious handicap. Without this elevator we cannot move cases or larger exhibits from

one floor to another. Just now we cannot move a small whale from the basement work-room to our Mammal Hall on the Second floor. We have been trying to remedy this at a cost which can be amply justified. With the aid of the Budget Bureau and the State Inspection Service we hope to solve this problem soon.

We need very much to place more fluorescent lights which greatly improve individual exhibits. We should extend general overhead lighting to our three unlighted halls. This latter is especially needed for cloudy days or short days of the winter season.

Personnel: Withal our accomplishments have been the result of the zealous efforts of the Museum workers. As the demands upon the Museum grow it becomes apparent that more personal service, a larger staff, for the Museum is needed. In one way or another effective workers have to have special training for this work. Mrs. Sophie Green resigned from our staff in June, 1939, after three months of trying to handle Museum office work along with another assignment in the Department.

After six weeks without office help we secured the services of Miss Patty Pittman of Rocky Mount, who had the college training to qualify her for learning Museum work. In addition Miss Pittman has enrolled for the 1940 Summer Course at the University of Iowa for more training in techniques and background painting as applied in Museums.

Mrs. Roxie Collie Simpson continues her good work as Preparator and Taxidermist. Our most immediate need in personnel is that she be employed to work here for twelve months of the year and not for just nine months. We very much need the 25% increase in her work. Thereby we would save many valuable and needed specimens that we lose.

H. H. Brimley continues to do excellent work. He has mounted the large Blue Marlin and he is making good progress with the Beaked Whales. More important perhaps is the valuable contributions he is making towards the revised copy for the Bird Book. His career since 1884 has been related to the Natural History of North Carolina.

This personnel and the writer are called upon to answer queries that rival a "Quiz Program" every day. We deem it a Museum function to respond and explain. The laboratory continues to receive and report upon about 300 mineral specimens each year. In these days of strategic minerals this has potential importance.

SEED LABORATORY

J. W. WOODSIDE

A total of 23,802 samples of seed were tested by the Seed Laboratory during the biennium. This number represents a 15 per cent increase over the biennium of July 1, 1936 to June 30, 1938, which was a record testing period. There was no increase in the personnel during the biennium.

The percentage of the work represented in the classification of "samples from individuals" remains high. This is made necessary because there are no commercial seed laboratories in the State and this service enables seed producers in the State to properly label their seed.

A Federal Seed Act, framed to coöperate with the State Seed Laws, was enacted in 1939. The North Carolina Seed Laboratory is coöperating with the enforcement agency of the Federal Act. This enables us to better control the quality of seed produced in other states which are used by North Carolina farmers.

During the last year of this biennium, the official grade of each sample of lespedeza analyzed was indicated on the report.

In the statistical report that follows the number of seizures and withdrawals are listed. Those listed as "Withdrawn until relabeled" were the lots of seed found by analysis, on officially drawn samples, not to be properly labeled. These were withdrawn from sale until properly labeled. Those listed as "Withdrawn on account of poor quality" were the lots of seed found by analysis, on officially drawn samples, to be of such poor quality because of noxious weed seed, total weed seed, or low germination that they were unfit for seeding purposes. These were withdrawn from sale and ordered to be used for purposes other than seed or returned to the wholesaler. Those listed as "Withdrawn for violation of revenue provisions" were withdrawn because the dealer had failed to comply with the licensing section of the Seed Act, or had failed to attach the official North Carolina Seed Tag.

STATISTICAL REPORT

	1938-1939	*1939-1940*
Samples from individuals	10,484	10,670
Official (Samples drawn by Inspectors)	1,623	1,025
	12,107	11,695
Total for the biennium	23,802 samples	

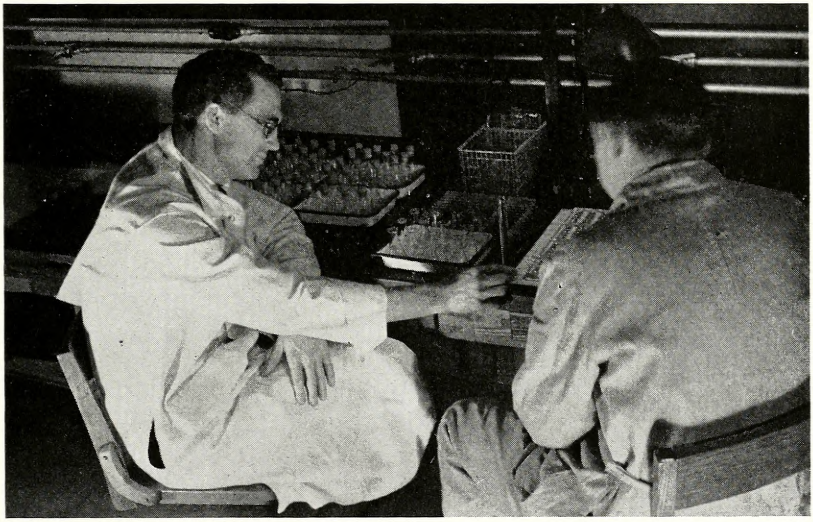
SEIZURES AND WITHDRAWALS

	1938-1939	*1939-1940*
Withdrawn until relabeled	80	78
Withdrawn on account of poor quality	42	17
Withdrawn for violation of revenue provisions	113	210
	235	305
Total for biennium	540 lots	

DIVISION OF SOIL TESTING

DR. I. E. MILES

As the result of a special tax upon fertilizers levied by the 1938-1939 General Assembly, the Soil Testing Division has been established for the purpose of analyzing soils for the farmers of the state, advising them as to the crop adaptations, and recommending the analysis and quantity of fertilizers needed to produce economically a specific crop upon the soil analyzed. The work was actually initiated on July 15, 1939, at which date the director was employed.



THE SOIL TESTING TECHNICIANS TESTING SOIL FOR PLANT FOOD DEFICIENCIES.

LABORATORY

Since there was no laboratory available for this work, office rooms had to be adapted to this purpose. This was somewhat a laborious task and required considerable time. Due to the foreign situation it was difficult to secure scientific equipment, as well as a great many other materials, in many instances requiring months. This necessarily retarded the equipping of the laboratory, but it was finally sufficiently equipped to do testing work by the first of the calendar year 1940. It was not entirely completed, however, until after the peak of the spring work had been finished. Today we feel that it is one of the best equipped soil testing laboratories in the United States. With a few adaptations from time to time very large numbers of soil samples can be handled.

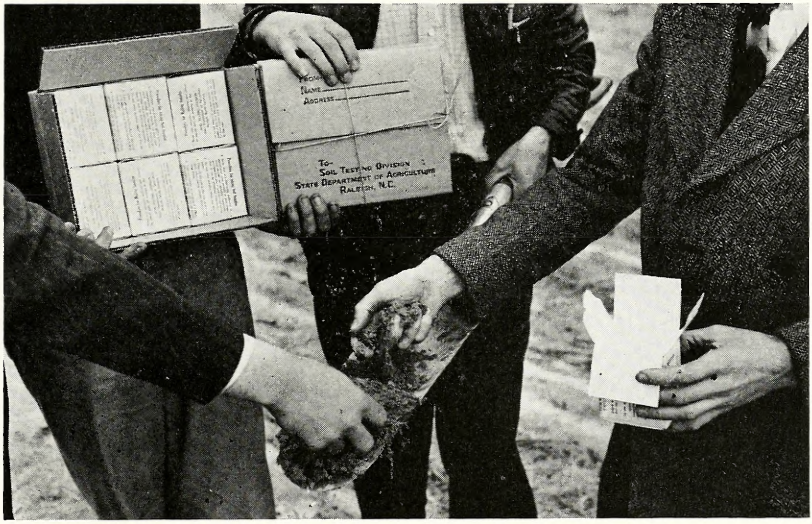
EDUCATIONAL PHASE

Since the work was new it was necessary to do a considerable amount of educational work. A great deal of time was spent in the field with the agricultural leaders and farmers. An effort was made to coöperate with all agricultural agencies. It seemed, however, that the agricultural high school teachers and fertilizer dealers were the people who showed the greatest spirit of coöperation. Through the agricultural teachers in their evening adult classes we contacted large numbers of farmers all over the state. We feel that this work was invaluable in showing the nature and possibilities of the work.

FUTURE FARMERS OF AMERICA RECEIVING INSTRUCTIONS FOR COLLECTING SOIL SAMPLES.

There has always been a problem in getting the farmers to use suitable containers for collecting and mailing their samples. The containers used are frequently contaminated, sometimes containing materials that would absolutely make the test worthless. Other containers are of such nature that they will not go through the mail without being destroyed. And certainly if there were no uniform container there would be every shape and form sent to the laboratory when large numbers of samples are collected. With this in mind new cartons, both for individual soil samples and for mailing the samples, were designed and purchased. The new soil sample cartons were waxed so as to retain the moisture of the soil as it exists in the field and, consequently, they give the soils man a chance to see the soil as it existed in the field. Fur-

thermore, instructions for collecting the samples are printed upon the carton. It is a breakdown type so as to occupy but little space and a place is provided for identification of the soil. The mailing carton will hold six of the individual soil sample cartons. It is a heavy corrugated material, is also a breakdown type, and is self-addressed. For the first year it was necessary that we place a charge upon these containers. The small ones were sold for 1¢ each and the large mailing cartons for 4¢ each. They have been very well accepted by the public, being used almost to the exclusion of all other types of containers. They are cheaper than



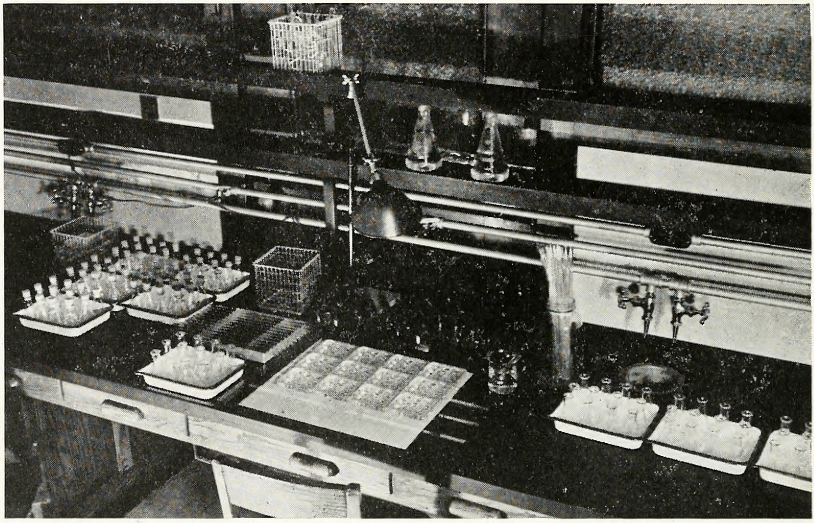
THE NEWLY DESIGNED SOIL SAMPLE CARTON AND MAILING CONTAINERS WHICH HAVE BEEN VERY WELL RECEIVED AND HAVE PROVED TO BE VERY SATISFACTORY.

other cartons and very convenient to handle. During the year there were approximately 25,000 individual and 3,900 mailing cartons distributed. Most of these cartons have been paid for, there only being $53.00 unpaid. These cartons will be supplied to the public without charge during the next fiscal year.

SAMPLES TESTED

The major portion of the testing was done during the spring months. This probably will always be true but hereafter we are going to attempt to get the public to distribute their samples, sending in larger numbers throughout the year rather than waiting to have all of the work done in the spring of the year. In this fiscal year there were some 70,000 different tests made on approximately 6,500 soil samples. All top soil samples were

tested for calcium, magnesium, nitrogen, phosphorus, potassium, iron, aluminum, manganese, organic matter, and degree of acidity. Similar tests were made on a great many of the subsoil samples and a large number of the subsoil samples were only tested for the degree of acidity. With the results of the analyses of the soils, together with such information as could be secured from the farmer and the agricultural experiment station, fertilizer recommendations were made for the crop and soil concerned.



SOIL TESTING LABORATORY SHOWING SOME OF THE EQUIPMENT.

FOLLOW-UP WORK

Prior to July 1, 1940 the crops were so small that it was impossible to do much follow-up work in the field. However, after the crops have made considerable growth there will be a great deal of work done in the field in which the agronomist will be contacting the agricultural leaders and the farmers who actually used the fertilizer recommended. This will be done in an effort to find flaws in the present-day method of testing and to serve as a basis for further improvement. It will also serve as further educational work for both the Department of Agriculture and the Division of Soil Testing.

STAFF

The staff of the division for the first year included the director, a soil chemist, a secretary, a stenographer, and a janitor. During the peak of the work there were two other stenographers, two other chemists, and four extra laborers employed.

FINANCIAL REPORT

The expenditures for the year can be very well shown in tabular form. They are as follows:

Salaries	$ 6,302.59
Office supplies	256.31
Postage	237.25
Telegrams, telephone, and express	81.68
Travel	943.89
Scientific supplies	2,502.77
Laboratory equipment	3,992.31
Office equipment	539.43
Total	$14,856.23

DIVISION OF STATISTICS

FRANK PARKER

During the past two years, your Statistical Division has experienced several vital changes. Mr. W. H. Rhodes, Chief of this Division, died a year ago. He was not directly replaced and the salary available would not interest any qualified man. Instead Mr. J. J. Morgan, formerly of this office, was secured on the federal rolls and Mr. Parker, as Federal Statistician, was also given nominal charge of the state work, and thus the entire Crop Reporting Service. This was similar to conditions existing when the Service was organized in 1919. The death of Mr. Rhodes was a very serious loss, as he had aided in the development of this work since 1919. Even after a year, we frequently miss his counsel, good ideas, energy, push, and great help. Such long and varied experiences cannot be replaced.

When considering that the cycle of work in the Crop Reporting Service is 12 months, it is easy to understand why at least three to five years are necessary to gain a good grasp of this work. It would obviously require much longer for a new statistician to take entire charge of the office, even with much experience in another state. This explains the importance of encouraging our employees for long service, as the first year is largely one of instruction and getting acquainted.

Outlined on the following page are some of the biennial results required of statisticians in the Crop Reporting Service Division.

	1938	*1939*
A. CROP REPORTS COLLECTED (July to July):		
Number of schedule inquiries	138	213
Copies mailed	301,985	344,998
Questions asked (items)	3,159	4,297
Reports used	62,802	73,219
B. FARM CENSUS SURVEY:		
Townships reported	1,038	1,039
Farms reported (usable)	265,898	250,229
C. THRESHER OPERATORS:		
Operators reporting	1,955	1,886
Acres of grain reported	411,829	361,611
D. STATISTICAL RELEASES AND REQUESTS:		
Crop Report releases	74	111
Copies issued	197,965	217,437
Pages in releases	175	253
Special "Agricultural Situations" mailed	83,600	83,600
Requests handled	8,653	8,101
E. TRAVEL:		
Miles of official travel in field	18,861	25,574
F. REPORTS COMPILED FOR WASHINGTON OFFICE	150	260
G. COUNTY ESTIMATES MADE (Items)	1,742	*12,353

*Also includes County Prices for U. S. Census.

The travel of our statisticians is necessarily rapid, intensive, and diversified because: (1) Our funds are limited. (2) Statewide conditions and crops must be studied. (3) The time available is limited and studies must be current.

Thus the purpose is multiple. For example, from Elizabeth City to Gatesville in September one must: (1) Examine cotton fields at five mile intervals. (2) Carefully observe the growth and prospective yields of each crop. (3) Peanuts must be examined. (4) Farmers and business men must be interviewed for interpreting observations. (5) Notes must be kept. (6) Certain county officials must be contacted regarding Farm Census and peanut picker surveys. (7) From three to five counties must be covered daily. Much the same applies in all other places. One must be ever alert for occasional objectors, and ready to aid those who need clarifications.

The output of this office has been increased 35 per cent in two years, with little increase in funds or personnel. This has meant sacrifices of service, travel and other features which the public notices. Page 9 outlines the new services incorporated by this office.

The fact that the North Carolina Crop Reporting Service work is now officially rated THIRD in the United States is very significant of its scope and accomplishments. While in the value of all crops we rank about SIXTH, in the value of all farm products we are about THIRTEENTH. In total crop land, we rank SIXTEENTH. Thus, our Statistical Service rank is quite a compliment to this Department and State. Some of the reasons for the high national rank of the North Carolina Crop Reporting Service are listed below:

1. Excepting California, the most diversified.
2. Farm Census Survey rating very high.
3. Multiplicity of reports, schedules, and tabulations.
4. Excellent state coöperation.
5. Special features and type of work handled.
6. Our latest "Agricultural Statistics" publication has been acclaimed the best yet issued. Facts that most agricultural leaders need are therein anticipated, and provide pleasant and lasting impressions of the statistical services of your Department.

The subconscious influence on North Carolina Farmers, as a whole, through making out crop reports, Farm Census, and threshers' records is tremendously beneficial. This was proved in establishing the Agricultural Adjustment Administration programs in North Carolina. In turn, the Agricultural Adjustment Administration reports have greatly aided and enhanced the Crop Reporting Service activities. Instead of conflict, these

services have worked in harmony for mutual benefits. Their purposes are quite different; so neither duplicates the work of the other.

Education is an essential part of every progressive and helpful service. Prejudice is the natural obstacle to new objectives whether it be conscription, expanded city limits, or new features in the school curriculum. Marketing and inspectional services are no exceptions. So it is with statistics, a subject which is too generally regarded as dead—lifeless—mere figures. So is a "dead—lifeless" museum or library, to those who are unwilling to see beyond the bare appearances. However, statistics provide the most comprehensive and condensed form of factual information. Some men learn only from experience, while the wise man prefers to learn from the many experiences of others—statistical evidence.

EDUCATION AND EXPERIENCE REQUIRED OF STATISTICIANS

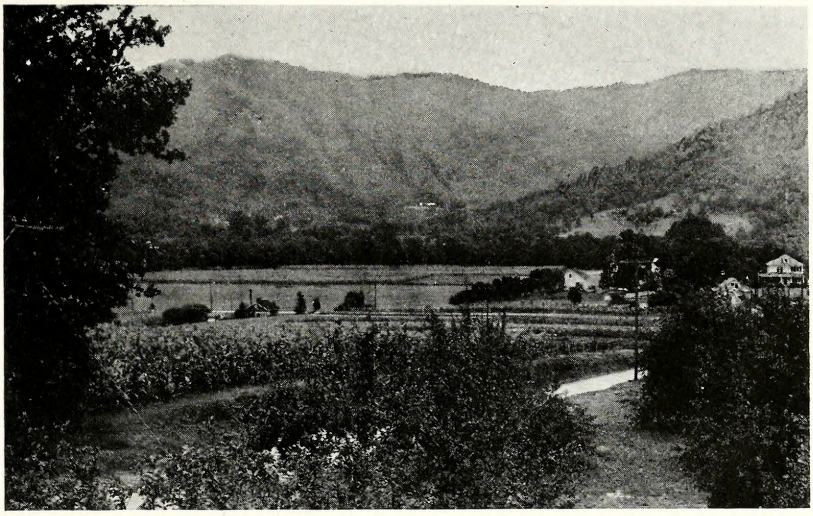
These men must be farm reared in order to know the underlying factors behind the farmers' judgments. They must be able to visualize all stages from preparation of soil to the harvest and the effects of varying weather conditions. The habits of each crop, livestock, and soil must be familiar. Judgment must be almost instantaneous before the statistician is qualified for independent activities.

The pictures herewith represent usual features of the statist's responsibilities, for unless current field conditions are known, one may misinterpret the hundreds of judgments reported.

OFFICE CONDITIONS

With the steadily increasing work resulting in the present output of reports being twice that of three years ago, more office space would normally be required. Since the same space is used, obviously quite crowded conditions are now being experienced. Whereas most other divisions have reasonable space, the Statistical Division requires three desks in Mr. Parker's dark office and six desks in Mr. Morgan's room. The necessary files have literally crowded conditions to the point that much important current material must be kept in the basement. Fortunately, much better light conditions have been obtained this year—1940.

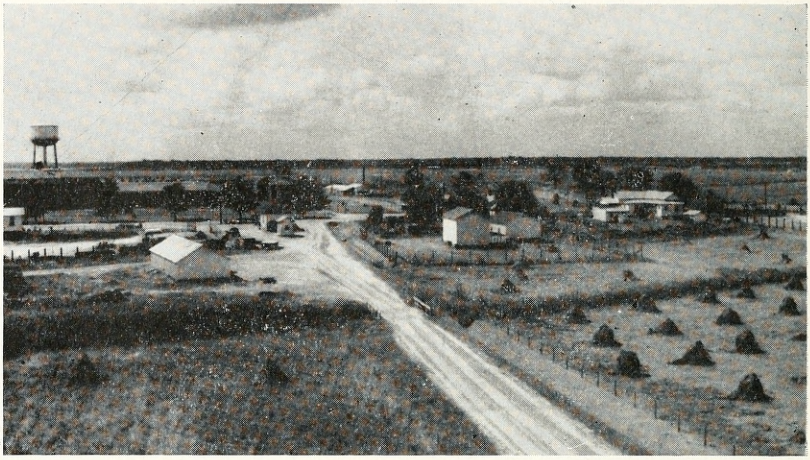
The first floor rooms of the Library Commission would relieve the Board Room and Farm Census, when they vacate. With 25 W.P.A. workers and 15 Farm Census clerks, this space would not be excessive.



MOUNTAIN TEST FARM, SWANNANOA; BUNCOMBE COUNTY.

These farms are ideal studies for the statists, because of the diversity of studies available. Here we have fruits, grains, poultry, cattle, pastures, feed crops, vegetables, and mountain conditions and the aid of a superintendent who is intelligent and in sympathy with crop report purposes. This was taken just after the August floods, (1940).

FLOODS AND DROUGHTS CAUSE SERIOUS DAMAGES. ONE COMES SUDDENLY AND THE OTHER SLOWLY. THE DUST RISING BEHIND THE RIDING CULTIVATOR INDICATES A FINE SILT SOIL AND VERY DRY CONDITIONS, WHICH PREVAILED DURING LATE JULY AND EARLY AUGUST, 1940.

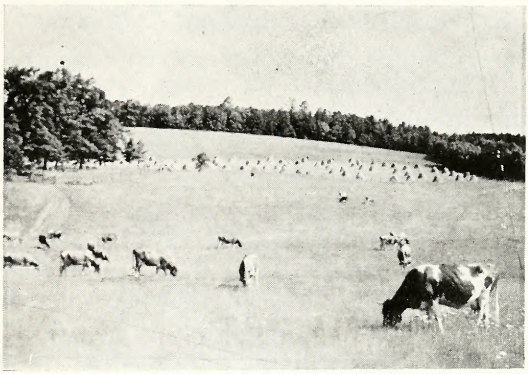


CALEDONIA PRISON FARM; HALIFAX COUNTY.

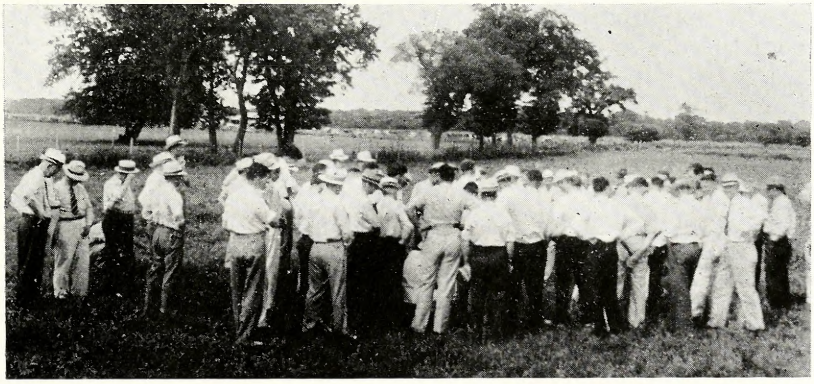
This is representative of large plantation conditions, on variable types of soil. Looking west, water was 9 feet over the bridge about August 25. It was 2 feet where foreground road entered one in background going crosswise picture. The higher land is at left background and low ground at far right and east (back of photographer).

TRUCK CROPS; BEAUFORT COUNTY.

Prospective yields must be anticipated by personal examinations as well as growers' judgments. Corn is planted here between rows 15 to 20 days before potatoes are harvested. A great expansion has been made in commercial truck crop report work this year (1940).



DAIRYING HOLDS A PROMINENT PLACE IN THE FIELD OF CROP REPORTING SERVICE WORK. THUS, RELATED FARMING ACTIVITIES ARE IMPORTANT AS WELL AS FAMILIARITY WITH DAIRY PROBLEMS, MANAGEMENT, PRICES, AND EVEN THE HANDLING OF MILK SOLD BY FARMERS FOR RETAIL AND MANUFACTURE OF ICE CREAM AND OTHER PRODUCTS. CONSPICUOUS EXPANSION OF THIS WORK HAS BEEN MADE DURING THE PAST TWO YEARS.



EDUCATIONAL: PENDER COUNTY.

At a recent meeting of North Carolina's Vocational Agricultural Teachers at the Penderlea farm, careful studies of field and livestock practices were made. These important leaders in educating both high school and other young farmers, are taking an active part in familiarizing their farmers with the values and usages of crop reports. They find it distinctly helpful in their class and project work.

THE NEW FEATURES ESTABLISHED IN THE CROP REPORTING SERVICE DURING THE PAST TWO YEARS

1. The Dairy Manufacturers' Report was secured through an enactment of state legislation and in coöperation with the Dairy Division. This information enables North Carolina for the first time to really know the approximate manufacturing figures on dairy products and their location.

2. Special Truck Crop Reports were started last January. By July these were on a very satisfactory basis and commercial truck men are highly pleased with them. Not only is good information being collected but good report services are being distributed.

3. United States Census Prices were secured for the first time through this office. The coordinating committee of the United States Census and the Department of Agriculture decided that this agency is best for securing prices by counties on hundreds of commodities. This was a tremendous task, involving long work. No extra help was employed.

4. Effective and agreeable Agricultural Adjustment Administration and Crop Reporting Service relations have been established. Each realizes and feels the need of the other as a check source of its statistical information. It is well established that there is no duplication of work, effort, or information resulting from these two organizations. It would be prohibitive for the A.A.A. to handle the Farm Census or to collect detailed crop information from their own surveys or measurements.

5. This office is now handling regularly the grain reports of thresher operators which were previously submitted through the Register of Deeds. This has proved more satisfactory already than the old arrangement. The Register of Deeds is expected to issue licenses and supplies but the administration will be handled from the state office and operator reports sent directly to Raleigh.

6. The Farm Census, established in 1918 and enacted into law in 1921, was secured on a harvested base for the first time in 1940. The shift was necessary because of the tax listing date being shifted from spring to January. While much of the *current* usage is lost, the reliability is improved.

7. There has been a great increase in number and scope of reports during the past two years as indicated by statistical data and special reports. In other words, the work on the reports has been increased greatly beyond the workers provided. This necessarily means that efficiency and application have been improved.

8. One of the most momentous achievements of the past two years has been the development of the "Junior Crop Reporting

Clubs". This simply means that Vocational Agricultural Teachers are each privileged to establish a club of 12 students, who are interested in training in crop report work and usages of this type of information. Since they must have contact with their parents, this virtually means that 24 new reporters will be established for each club developed. Since there are over 400 Agricultural Teachers, the possibility of this kind of organization may be visualized. Obviously, this must be on a voluntary basis.

9. The Crop Reporting Service is now perhaps on the best basis of its history, although the work required is twice that of three years ago. The organization and systemization of the work has effected a greatly increased service. Statistically prepared young men are being secured for this work, the wisdom of which is well established. The increased requirements have necessarily meant relinquishing much of the non-essential work such as publicity and personal service. Plans are now made for reestablishing all of these on an even better basis than previously.

10. Educational work. Statistical work, dealing mainly in figures, is rather unattractive to the average person; therefore, educational work is required. Efforts in this direction are now being made and should soon take effect. Within the next two years, quite a different attitude may be taken toward the Crop Reporting work by all of our agricultural leaders. Experience has shown that many farm leaders look on this work as unnecessary and of doubtful value. After they once get into it, they are ardent reporters and surprised that any such values are available in this seemingly historical type of information.

11. Coöperative relations. Definite steps have been taken with coöperating agencies looking to the establishing of harmony and more effective work. For example: A Statistical Laboratory at State College is being encouraged. This is the logical location for such a laboratory for the Southern States. This simply means that special developments, improved methods, advanced analyses, and overflow work for these states would be handled here. Obviously, nationally recognized statisticians would be prerequisites. Our rank of THIRD is a strong card favoring its location here.

The Division of Statistics has the privileges and benefits of both the state and federal information and services.

VETERINARY DIVISION

DR. WILLIAM MOORE

Bang's Disease. Bang's disease, also referred to as infectious abortion, bovine infectious abortion, contagious abortion, abortion disease, etc. is a transmissible disease, due to a specific organism or germ affecting many animals but causing the greatest loss and damage to cattle. This is a very versatile organism; in addition to causing most abortions in cows, it causes many weak calves to be born, most of which die later; it is the cause of considerable breeding trouble, retention of afterbirth, temporary and permanent sterility and a great loss in milk production. This disease affects hogs but we have not found it very prevalent, although we have made a great many tests and have found some infection. This disease also affects man and is known as undulant fever, being transmitted to man by contact with infected animals, especially swine, and through the drinking of milk from infected animals.

A large amount of work directed toward the control and eradication of this disease has been done since 1934 in coöperation with the United States Department of Agriculture, which has supplied most of the funds for the work. From 1934 to July 1, 1937, an intensive campaign of Bang's disease eradication was conducted with herd owners throughout the state, testing most of the purebred and commercial dairy herds. From the beginning of this work, the United States Department of Agriculture paid an indemnity to an owner for cattle slaughtered on account of being affected with Bang's disease, based on one-third of the difference between the appraised value and the salvage of the animal and not to exceed $25.00 for grade or $50.00 for pure bred animals. In 1938 Congress provided that no such indemnity could be paid after May 1, 1939 unless such payments were matched by State payments. The 1939 General Assembly made an appropriation (Ch. 272 P. L. 1939) for the payment of indemnity on the same basis as heretofore. For the fiscal year ending June 30, 1940, a total of $20,320.93 was paid on 886 claims. On July 1, 1937, area work—that is, the testing of all cattle in a county in coöperation with the County Commissioners—was started in accordance with Chapter 275, Public Laws 1937. The following is the status of area work as of June 30, 1940:

County	*Date Test Started*	*Date Initial Test Completed*
Mecklenburg	June 16, 1937	Jan. 1939
Cabarrus	July 1, 1937	Feb. 28, 1938
Wayne	July 16, 1937	Feb. 15, 1938
Yadkin	July 20,1937	April 1, 1938
Rowan	July 20, 1937	June 30, 1938
Forsyth	Aug. 23, 1937	June 30, 1938

County	*Date Test Started*	*Date Initial Test Completed*
Guilford	Sept. 7, 1937	Jan. 31, 1939
Davie	Dec. 6, 1937	May 7, 1938
Haywood	Dec. 6, 1937	Jan. 19, 1939
Union	Feb. 15, 1938	Jan. 17, 1938
Catawba	Feb. 16, 1938	Dec. 17, 1938
Davidson	Mar. 1, 1938	Nav. 17, 1938
Durham	April 25, 1938	Oct. 15, 1938
Iredell	May 9, 1938	April 30, 1939
Lincoln	June 16, 1938	Nov. 27, 1938
Gaston	June 16, 1938	Feb. 15, 1939
Buncombe	July 1, 1938	
Stanly	July 1, 1938	Mar. 8, 1939
Granville	July 5, 1938	April 30, 1939
Wake	July 5, 1938	June 7, 1939
Macon	July 16, 1938	May 27, 1939
Beaufort	Aug. 1, 1938	Jan. 16, 1939
Orange	Oct. 16, 1938	April 30,1939
Johnston	Nov. 1, 1938	Oct. 14, 1939
Moore	Nov. 28,1938	May 14, 1939
Burke	Jan. 3, 1939	Jan. 27, 1939
Gates	Jan. 17, 1939	April 15, 1939
McDowell	Jan. 20, 1939	July 25, 1939
Anson	Mar. 9, 1939	Oct. 21, 1939
Bladen	May 1, 1939	Sept. 20, 1939
Surry	May 1, 1939	March 23, 1940
Cleveland	May 1, 1939	March 28, 1940
Cumberland	May 15, 1939	Nov. 15, 1939
Clay	May 29, 1939	Sept, 13, 1939
Alamance	June 8, 1939	Aug. 5, 1940
Madison	July 24, 1939	
Cherokee	Sept. 16, 1939	Mar. 22, 1940
Duplin	Sept. 21, 1939	April 16, 1940
Chowan	Sept. 25, 1939	Dec. 15, 1939
Rockingham	Oct. 16, 1939	
Alleghany	Oct. 16, 1939	April 3, 1940
Richmond	Oct. 23, 1939	June 1, 1940
Rutherford	Oct. 24, 1939	
Ashe	Nov. 1, 1939	
Columbus	Nov. 16, 1939	June 8, 1940
Bertie	April 1, 1940	Aug. 3, 1940
Onslow	April 1, 1940	
Randolph	April 1, 1940	
Jones	April 17, 1940	May 29, 1940
Edgecombe	June 1, 1940	
Robeson	June 10, 1940	
Lenoir	June 10, 1940	
Lee	June 12, 1940	
Alexander	June 17, 1940	
Washington	June 18, 1940	Aug. 13, 1940
Hyde	June 20, 1940	
Pitt	June 22, 1940	
Nash	Testing in progress	
Pender	On waiting list	
Northampton	On waiting list	
Polk	On waiting list	
Chatham	On waiting list	
Wilson	On waiting list	
Watauga	On waiting list	
Carteret	On waiting list	
Montgomery	On waiting list	
Vance	On waiting list	
Yancey	On waiting list	
Harnett	On waiting list	

The following is a summary of the testing done during the period covered by this report:

JULY 1, 1938—JUNE 30, 1940

Month	*Total Number Cattle Tested*	*Total Number Reactors Found*
July 1938	16,965	414
August	19,359	402
September	21,561	244
October	22,617	194
November	17,602	231
December	14,175	170
January 1939	15,627	144
February	19,293	172
March	29,257	155
April	16,627	108
May	16,486	85
June	15,880	143
July	13,354	153
August	11,796	207
September	13,261	162
October	17,276	86
November	17,503	81
December	14,929	33
January 1940	12,254	66
February	16,456	85
March	18,436	109
April	19,961	165
May	18,179	149
June	16,044	136
Total	405,898	3,894

It will be noted that the percentage of infection has been greatly reduced. It is believed that this disease can be practically eliminated under our present program within a reasonable time. From July 1, 1934 to July 1, 1940, a total of 793,148 tests were made and 17,491 reactors were found.

In addition to the above, all of the State owned herds and the herds of charitable institutions have been tested and at this time I am very glad to report that we have been able to eradicate this disease from these herds.

BOVINE TUBERCULOSIS

Work in the eradication of this disease has been confined to the testing in counties on which the three year accreditation period has expired, State owned herds, herds of charitable institutions, herds to which imported cattle have been added, and herds known to be infected. The following is a summary of the testing done during the period covered by this report:

Month	Total Number Cattle Tested	Total Number Reactors Found
July 1938	2,522	1
August	1,765	0
September	2,501	0
October	2,953	0
November	3,756	1
December	1,382	0
January 1939	1,876	0
February	2,624	3
*March	2,116	26
April	4,045	0
May	3,913	0
*June	2,957	9
July	1,992	1
August	3,374	0
September	918	1
October	2,548	0
November	3,270	0
December	2,396	0
January 1940	1,307	0
February	3,031	1
March	2,822	0
April	4,717	0
May	2,256	0
June	3,894	0
Total	64,935	43

*All reactors from same herd.

Many of these animals did not show visible lesions and others showed only slight lesions. We can therefore say that this disease has been practically eliminated from the cattle population of this State. All of the diseased animals referred to were slaughtered and the owners were paid an indemnity of one-third of the difference between the appraised value and the salvage, not to exceed $25.00 for grades and $50.00 for purebreds.

Numerous requests for testing are received which we are not able to handle. We consider this a purely personal service and in many instances the cost of testing would be greater than the value of the animals tested. Such testing can be done by local veterinarians at much less cost than the expense to the State.

Cattle Fever Tick

No cattle fever ticks have been found during the period covered by this report, notwithstanding that we have made a very large number of inspections in all sections of the State. Cattle fever ticks have not been found since 1929, at which time a small outbreak was discovered in Sampson County.

Pullorum Disease

A satisfactory program of blood testing poultry flocks for the elimination of pullorum disease under the National Poultry Improvement Plan was carried on with about 100 hatcheries during

the two seasons covered by this report. The rapid stained antigen test has been used with very satisfactory results. The following is a summary of the work for the past six years:

SUMMARY OF CULLING, SELECTING, AND PULLORUM TESTING OF HATCHERY SUPPLY FLOCKS—1934-35 TO 1939-40, INCLUSIVE

YEAR	No. Flocks Tested	No. Birds Tested	% React.	No. Birds Retested	% React.	Total No. Culls	No. Birds Handled
1934-35	702	98,381	3.03	28,075	2.34	17,989	144,445
1935-36	756	117,384	3.51	36,167	1.11	18,912	172.463
*1936-37	1.199	198,545	30.3	78,860	2.08	31,780	309,185
1937-38	1,070	195,080	3.52	123,843	1.36	32,987	351,910
1938-39	1,656	314,120	1.94	171,433	.78	34,877	520,430
1939-40	1,785	394,383	1.99	195,289	.75	50,501	640,173

*National Poultry Improvement Plan adopted.

The diseased birds, along with the culls, were marked and removed immediately from the flocks and sold for slaughter. This work is very popular with the flock owners for whom tests are made and hatcherymen have found that without this testing work, it is impossible to produce a satisfactory chick. With this test, when supported with strict sanitation and proper brooding of chicks on the part of the flock owner, pullorum disease can be controlled almost 100 per cent, but without this coöperation, the testing will merely hold the infection to a lower per cent. As a result of the careful flock selection conducted in connection with this work, the flocks have been greatly improved as has the quality of the baby chicks.

RABIES

The general operation of the State Rabies Law, Chapter 122, Public Laws 1935, so far as the Department was concerned, was placed in this Division early in 1935 and has been continued. This is another dog law that does not seem to be very well observed. During the 1935 season, 62 counties made some effort to comply with the law but only a small number of counties vaccinated extensively. We distributed during the 1935 season 63,370 doses of vaccine and with vaccine purchased from other sources, it is estimated that about 100,000 dogs were vaccinated, representing probably less than 25% of the dog population of the State.

During the 1936 season, there were about 36 counties that made some effort to comply with the rabies law and only a small number of these counties vaccinated the greater percentage of the dogs. More than 50,000 doses of vaccine were distributed in 1936 during the season and considering vaccine purchased from

other sources, it is estimated that there were about 75,000 dogs vaccinated. In 1937 we distributed 10,000 doses of vaccine and in 1938, 8,550. There were about seventeen counties that coöperated during 1937 and about ten in 1938. In 1939 we distributed 7090 doses and in 1940, 4000 doses. Seventeen counties coöperated to some extent and fifteen in 1940, which shows a gradual falling off in the use of vaccine under the law. Estimates on the number of dogs in the State run from 200,000 to 1,000,000. I think it is safe to assume that there are at least 500,000 dogs in the State. We estimate that there were 100,000 dogs vaccinated in 1935; 75,000 in 1936; 25,000 in 1937; and perhaps 15,000 in 1938 and about the same for 1939 and 1940. Taking the highest number in any year, 100,000 in 1935, there would be only about 20% of the dog population vaccinated in widely scattered areas and this certainly could not be responsible for any great reduction in rabies even though we assume that the vaccine is highly efficient. During the past two years, several counties in which rabies had been prevalent, worked out a program of vaccination by the local practicing veterinarian, not strictly in accordance with the law but which has apparently given good results. The present rabies law has been studied and commented on by a great many persons qualified to do so, but I know of no one who might be classed as an authority, who has endorsed this law or who believes that it will accomplish the purpose for which it was intended. I think that the present law has been given a fair trial and found inadequate and that a new law should be enacted, giving the County Health Officers or the County Board of Health full authority to carry out such control measures as they may deem necessary, as is the law in other public health matters. The law should be short and explicit so as not to be misunderstood and the County Board of Health should be given authority to make regulations to carry out the details.

One of the most important things in the control of rabies is the elimination of stray and worthless dogs. This is a difficult accomplishment and seems impossible under the present law. I doubt the advisability of State-wide vaccination but believe that such vaccination should be confined to areas where the disease is known to exist. By referring to the records of the State Laboratory of Hygiene, we find that for the five years, 1932-36 inclusive, that there were six counties in the state during this five year period that did not report a case of rabies. There were five other counties with only one positive case during the period and eleven counties with five or less during the five year period. We certainly could not justify the expense and trouble of vaccinating the dogs in these twenty-two counties, nor could we justify it from a disease control standpoint. A quarantine on all dogs,

properly enforced, together with vaccination instituted by the County Health Unit under a law such as I have suggested would, in my opinion, properly take care of the situation in these twenty-two counties and I believe that it would do the same in any county with less expense, confusion, and criticism than attempting a State-wide program of vaccination. Dog laws are always difficult of enforcement and it seems unreasonable to expect a sheriff of a county, upon whom falls the enforcement of the present act, to enforce such a law when he must frequently run for re-election. I hope that the present law will be satisfactorily amended by the next General Assembly.

CLINICS

Funds were made available for the holding of clinics in connection with breeding troubles and mastitis in dairy herds and these clinics were held during the week of April 1, 1940 at State Hospital, Morganton; Jackson Training School, Concord; N.C.C.W., Greensboro; State Hospital, Raleigh; and Caswell Training School, Kinston.

Dr. W. A. Hornaday, Greensboro, conducted the breeding trouble clinic and Dr. M. M. Leonard, Asheville, had charge of the mastitis clinic. Both of these men are experts in their line and conducted a most satisfactory clinic. All cattle in the above mentioned herds were examined and the institutions were given a detailed report of the findings. Splendid coöperation was received from the institutions. These clinics were well attended by the veterinarians of the state and they manifested great interest.

These are urgent problems facing the dairy industry and it is hoped that additional work can be done.

A diagnostic laboratory is to be established in the Division July 1, 1940 and when completed, we expect to conduct an experimental project on mastitis in coöperation with the N. C. Experiment Station, working with a number of herds in the State in an effort to work out a plan for the control of this serious disease.

ANTHRAX

On February 15, 1939 we had an outbreak of anthrax in a dairy herd in eastern North Carolina. We were never able to determine definitely the cause of this outbreak but we believe that it was due to the feeding of ground bone meal which was intended for the manufacture of fertilizer. Several cows died with this disease but we were able to prevent the spread to other farms and further loss on this farm by prompt vaccination. Anthrax will live on a premises for many years and it has, therefore, been necessary for us to vaccinate this herd frequently and this must be continued in the future.

HOG CHOLERA AND OTHER SWINE DISEASES

In view of the increasing importance of the swine industry (estimated 1,111,000 on farms Jan. 1, 1938) and the enormous loss from diseases that can be controlled, funds were made available July 1, 1938 to employ five veterinary inspectors, the number being increased to nine July 1, 1939, for the purpose of conducting a campaign for the prevention and control of swine diseases in the commercial hog-growing area where the greatest loss occurs. This work is a coöperative project with the United States Bureau of Animal Industry which furnishes two veterinary inspectors, one of whom acts as supervisor.

Inspectors were given a group of counties, from four to six, covering a total of 49 counties, which embraces most of the commercial hog growing area. This project is conducted in coöperation with the State College Extension Service, Division of Vocational Agriculture and the Farm Security Administration under a written memorandum of agreement, the coöperating agencies handling the educational phase while the North Carolina and United States Bureau of Animal Industry handle the disease control. Before placing these inspectors in their territories, they were given all of the available facts concerning diseases in the commercial sections, together with such other facts pertaining to the feeding, handling, etc., and they were instructed to go over their respective territories carefully in order to determine just what conditions were present and to make recommendations for the future. The reports from all of these inspectors are similar in so far as the diseases found are concerned, and the recommendations for their prevention and control were uniform. The diseases commonly found were: Cholera, flu, necrotic enteritis, mixed infections, parasitism, pneumonia, digestive disturbances, and mineral deficiencies. The less common diseases are erysipelas, mastitis, Bang's disease, and tuberculosis. All of the reports indicate that the principal predisposing causes of disease are:

1. The promiscuous use of hog cholera virus
2. Parasites
3. The lack of proper swine sanitation
4. Mineral deficiencies
5. Unbalanced rations
6. Lack of proper housing

In many of these counties serum and virus have been extensively used over a long period of years by county agents, agricultural teachers, and others. It has been known for more than twenty years that hogs given serum and virus would eliminate the virus in their excretions for a period of eighteen to twenty days and that susceptible hogs might contract cholera from this source and

that serum and virus properly administered to healthy swine would, in practically all cases, produce lasting immunity without bad results, but if administered to hogs affected with flu, mixed infections, necrotic enteritis, and internal parasites or other diseases, that instead of immunizing the hogs, it would, in many instances, produce an outbreak of cholera. Notwithstanding this information, the practice of the promiscuous use of virus, with little regard for swine sanitation, has continued. To quote from a report from one inspector in a territory where disease was quite prevalent: "My conclusion on cholera and vaccination is that there are more outbreaks of cholera started by the use of virus in vaccination than has ever been started by other means in recent years." All of the reports indicate that cholera is much more prevalent in those areas where promiscuous vaccination is widely practiced. As a matter of fact, in several counties where little, if any, vaccination was done, no cholera has been found during the period covered by this report. From the information we have, I am strongly of the opinion that the control of virus and the inauguration of swine sanitation would do more to prevent cholera, as well as other diseases, than anything that could be undertaken. In many counties, county agents and vocational teachers are spending considerable time in administering serum and virus and in nearly every such territory, cholera and other diseases are quite prevalent. In several counties, the county agents are active in the distribution of large amounts of hog cholera serum and virus.

In all of the counties, both internal and external parasites are found quite generally and the inspectors report that from 65 to 98 per cent of the hogs examined are found to be infested. Of the internal parasites found, the following are the more important: ascarides, kidney worm, whip worm, lung worm, stomach worm, modular worm, thorny head worm, intestinal thread worm; and the external parasites found are: lice, chiggers, and ticks. Internal parasites cause a heavy pig loss and it is estimated that of the pigs born in many instances, only 50 per cent are raised, and there is also a severe loss in that the animal fails to make proper gains from the feed consumed, in many instances making less than half of the gain that is made by pigs free of parasites and given the same amount of feed.

The plan of swine sanitation, as perfected by the United States Bureau of Animal Industry a number of years ago has proved valuable in the control of parasites and filth born diseases. A proper system of swine sanitation in the area referred to will do more to control cholera, parasites, and other common diseases than any other plan that might be adopted and would be the means of making it possible to raise a much greater percentage of

pigs and to allow them to make much more rapid gains on the feed consumed. Although swine sanitation is extremely valuable for the proper raising of hogs, yet its benefits are not readily apparent and it is therefore somewhat difficult to have it adopted generally. In many of the counties, little if any progress has been made in swine sanitation by the educational group. If all agricultural agencies will assist our inspectors, this program can be put over but it is going to be necessary to have full coöperation for best results.

Mineral deficiencies seem to be quite general over the entire territory, notwithstanding that information has been available on proper mineral uses for a number of years. In many herds, the hogs showed definite symptoms of a lack of minerals and in these cases it is necessary to use a concentrated form of mineral.

Many diseased conditions were found to be due to unbalanced rations. In many instances owners feed nothing but corn. Considerable work has been done on this but there remains much more to do.

Many diseases were found to be due to improper housing. This is especially the case following sudden changes of weather, during which time flu and pneumonia are quite prevalent. Much could be done to prevent diseases by improving housing conditions. Many pigs are killed by the sow that could be saved by proper housing. Community pastures are a frequent source of outbreaks of disease and present a problem that is difficult, if not impossible, to handle. Public livestock auction markets, referred to elsewhere in this report, are responsible for many outbreaks of swine diseases. Such markets must be regulated if swine diseases are to be controlled. In some counties in which we are working, there is a local law enacted by the Legislature authorizing the county agent and vocational teacher to use serum and virus. In several of these counties, promiscuous vaccination is practiced. The Division's program, of course, must conform to these local laws and it is therefore impossible to restrict the use of virus. We have received splendid coöperation in some of these counties but the question arises as to whether or not work in counties should be continued without coöperation. In view of the information secured, we have adopted the policy of having our inspectors investigate all reported outbreaks of swine diseases and apply such measures as are indicated for control, to restrict as far as possible the use of virus, and to devote all available time to swine sanitation. With the large territory assigned to each inspector, it is impossible for them to take care of requests for the vaccination of well herds not exposed to disease or to do other veterinary work.

In the interest of this work, it is recommended that the local laws in the seventeen counties permitting the promiscuous use of virus be repealed and that a suitable law for the regulation of public livestock auction markets be enacted.

PUBLIC LIVESTOCK AUCTION MARKETS

During recent years there has sprung up in all parts of the state public livestock auction markets, there now being a large number. At these markets a public auction sale is held one day of each week and all classes of animals are brought in for sale, not only by farmers but by livestock dealers and peddlers. Many of these markets are the outgrowth of a former horse and mule sale stable. Such markets perform a useful service in that they offer a market to the farmer who has only a small number of animals to sell; but on the other hand, they offer a real problem in animal disease control for the reason that many diseased or exposed animals are offered for sale and sold at these markets. Many outbreaks of cholera are started by hogs passing through these markets. The unrestricted movement of livestock by truck, often by irresponsible peddlers who sell the livestock to farmers, results in the spread of animal diseases. I would recommend to the Legislature that the Board of Agriculture be given explicit authority to regulate these markets not only in connection with disease control, but as to the entire operation of them. At present, anyone who desires may set up one of these markets, with no assurance that the farmer will be dealt with fairly or that he will even receive his money for an animal which is sold. I think that the Board of Agriculture should also be authorized to regulate the movement of livestock by truck.

EQUINE ENCEPHALOMYELITIS

This is a specific disease affecting horses and mules and has probably existed in this state for a number of years, causing in some years very serious losses in some sections. The disease is also known under the names of blind staggers, forage poisoning, etc. It has recently been found that this is a virus disease and experimental work seems to indicate that it is transmitted by mosquitoes and perhaps other biting insects. There was some loss during the summer of 1937 and 1938, while there were only a few cases in 1939 and none reported to July 1, 1940. There are two types of this disease known as the eastern and western. So far, we have only encountered the former but since there are many horses and mules shipped from the west, it is reasonable to expect that we may have to contend with both types. A severe outbreak of this disease occurred in the western part of the United States in 1937, involving more than 100,000 horses and

a larger outbreak followed in 1938. Satisfactory methods for the control of this disease have not been determined, although a vaccine has been perfected that is highly satisfactory in immunizing an animal.

MISCELLANEOUS

We have had a very large number of requests to investigate reports of outbreaks of disease. It has not been possible for us to take care of all of this on account of the greatly increased amount of laboratory and other work and a lack of personnel. Many of these requests for assistance are for a purely personal service that could be taken care of at less expense and entirely satisfactorily by the local practicing veterinarian. This presents one of the most unpleasant problems with which this Division has to deal. Many livestock owners apparently believe that the State should supply them free and prompt veterinary service for all occasions. This, of course, is impossible and, I think, undesirable. We have followed the policy of investigating so far as time and funds will permit, those reports that indicate that a serious contagious disease exists that without help might spread and seriously affect the livestock industry, and investigation is also made when a large number of animals are affected and the cause cannot be determined.

I am glad to report that no sheep scabies, black leg, or glanders have been encountered during the period covered by this report, although these diseases have previously existed in this state and we are constantly on the lookout for them.

Infectious keratitis, a serious disease affecting the eyes of cattle, seems to be on the increase. Much of this was brought in by E.R.A. cattle and livestock markets are responsible for much of the spread of this disease. A satisfactory method of control has not been worked out.

We have continued to look after the health of livestock on the twenty-two State owned farms and have made considerable effort with success to prevent disease among the livestock. We have continued to look after the health of the livestock on the prison farms and have found it necessary to keep all of their hogs vaccinated. Practically all of the prison camps have more or less farm land and on nearly all of them hogs are produced. Since all of these camps feed garbage from the prison kitchen, which is a prolific source of hog cholera, we believe that it is essential that these hogs be immunized against cholera. We have, therefore, inaugurated a systematic plan of vaccinating all of the hogs at these camps and all of the pigs that are farrowed.

WAREHOUSE DIVISION

A. B. Fairley

The following is submitted as a report of the operation of the State Warehouse System for the biennium of 1938-39 and 1939-40.

The number of warehouses licensed was one hundred and twelve (112) with a licensed storage capacity of 545,000 bales of cotton. As usual, the warehouses handled about sixty per cent of the North Carolina crop. Very few new warehouses were licensed as there is now a licensed warehouse in every cotton producing county in the State. These warehouses are so located that they are easily accessible to the cotton producers.

During the biennium a new cotton classing building was constructed at a cost of $30,000. This building is modern and up-to-date and built according to Government specifications. It is one of the best in the country, enabling the Division to give prompt and efficient service in cotton classing to the farmers in the State.

About 30,000 bales were graded yearly during the past two years. A coöperative agreement was signed with the Federal Government whereby Federal classers are assigned to work with the State classers, each assisting the other in any classing that has to be done.

The services of the gin inspector were continued and valuable help was rendered the ginners of the State thereby adding to the income of the cotton farmers by giving the farmers better ginning. Through the efforts of the inspector the ginners of the State were organized, and through this organization the Department should be able to greatly improve the ginning conditions of the State.

The System has continued its coöperation with the Weights and Measures Division, and has kept its weight testing truck busy testing gin scales.

The warehouses at Benson and Norlina which belong to the State were operated and brought in a good revenue to the State.

Warehouses owing the State have kept up their payments of interest, and most of them have made substantial payments on the principal.

Below we list the amount collected during the biennium and the financial standing of the State Warehouse System.

Amount Collected During the Past Two Years:

Interest	$ 28,502.06
Principal	43,712.53
Total	$ 72,214.59

LOANS TO WAREHOUSES:

L. M. Pittman and F. A. Cherry, Enfield, N. C.	$ 12,000.00
Textile Bonded Warehouse, Gastonia	1,050.00
Marshville Bonded Warehouse, Marshville	1,500.00
Total	$ 14,550.00

	Cash On Hand Principal Fund	Cash On Hand Supervision Fund	Loans—1st Mortgage On Whse.	Invested In Bonds
1939	$25,693.51	$29,963.00	$278,017.24	$333,500.00
1940	$39,954.30	$44,160.80	$265,656.45	$332,500.00

WEIGHTS AND MEASURES

C. D. BAUCOM

The demand for the services of the Weights and Measures Division during the past biennium has been greater than its ability to supply. The heavy duty scale testing outfit, having a testing capacity of 22,000 pounds, has been working at is maximum rate of speed ever since its purchase. It has tested 1,146 scales, yet the request for its services cannot be taken care of any ways like as prompt as should be. At the present rate, it takes about two years to cover the state once.

The enactment of the Weigh Master Act by the last Session of the General Assembly has also added considerable responsibility to this division. In the enforcement of this Act during the 1939-40 tobacco season, our inspectors made 1744 visits to the warehouses.

Demands for the investigation of short weight packages, canned goods, flour, rope, twine, thread and the like, have greatly increased during the last two years and considerable time has been spent on this type of work. I am happy to report, however, that in all cases, the manufacturer or packer took immediate steps to correct any errors on their part and have coöperated nicely in this respect.

The measurement of pulp wood seems to be satisfactory since the adoption of our Regulation No. 14, as no complaints have been registered for quite some time.

Our activity regarding type approval of new weighing and measuring devices prior to delivery in this state has been about as heretofore. The purpose of this phase of work is to "head off" the sale of weighing and measuring devices to merchants or users of same, which would naturally be condemned and possibly confiscated at a later date by our inspector because such devices were so designed or built as to aid in the perpetration of fraud. I am quite confident that we have saved our people many, many thousands of dollars since the adoption of this regulation. Prior to its adoption, it was a recognized fact that North Carolina was one of the dumping grounds for seconds, defective and condemned weighing and measuring devices.

Requests for calibration of tank trucks, according to Section No. 10 of our Weights and Measures Law has also required considerable time during the past biennium and we are now purchasing one, one thousand gallon and one, one hundred gallon test tanks to be installed in Raleigh so as to considerably expedite this activity.

During the past biennium, it has been necessary for the Department of Agriculture to adopt three new rules and regulations: 1. (No. 16)-relating to tolerances and specifications. 2. (No. 17)-relating to the Weigh Master Act, dealing with the sale of tobacco on warehouse floors. 3. (No. 18)-legalizing the sale of petroleum products by meter, under certain conditions.

There is one phase of service required by law, which we are unable to render due to lack of proper equipment and that is the ability to certify to the gross and tare weight of heavy truck loads on the highway. There is not a state or municipally owned scale in this state which has a platform and capacity large enough on which to weigh a loaded truck and trailer. We need a "Master" scale of 30 ton capacity and 60 foot platform in order to carry out the mandates of the law and render this much needed service. This scale could also be used to quite an advantage in certifying to the Revenue Department the weight of motor vehicles for licensing as well as assist the highway patrol in their curtailment of overloaded trucks on the highway. This piece of equipment installed, will cost about $5,000.00 including housing.

We are also very much in need of another heavy duty scale testing outfit in order to be able to test all platform scales in the state at least once a year. This piece of equipment will cost us about $4,000.00.

A summary of activities more in detail, is as follows:

WEIGHTS, MEASURES AND DEVICES INSPECTED

Approved	106,004
Condemned	13,346
Confiscated	2,266
Released	851
Total Number Inspections	122,467
Total Number Visits to Places of Business	13,774

STATE FAIR

DR. J. S. DORTON

North Carolina's 1938 and 1939 editions of the Great State Fair have been termed outstanding agricultural and educational successes.

In keeping with a policy adopted in 1937 when the State Department of Agriculture took over the Fair after it had been operated under private lease for a number of years, the premiums paid exhibitors have been increased gradually. The Fair has also enjoyed a growth in the total number of exhibitors.

Financial statements of each Fair operated for the past three years reveal reasonable profits have been returned to the patrons of the exposition and to the citizens of North Carolina.

Improvements have been made to grounds, and buildings each year, additional space has been allotted for agricultural, educational and industrial exhibits, comparatively large expenditures have been made to improve all phases of the Fair and a "rainy day" fund has been established to assure payment of premiums and operating costs in case of inclement weather.

The success of each State Fair is shared by such State Federal agencies as the State College Extension Service, State Department of Public Instruction, divisions of Vocational Education and Agriculture, the State Department of Agriculture divisions, the U. S. Department of Agriculture, State officials and other leaders in the field of agriculture and education.

Gradual increases in the number of exhibitors attest the value farmers and others have placed on a State-operated exposition.

The program of entertainment has been such that newspapermen, and patrons generally have been generous in their praise of this feature of the State Fair.

DIVISION OF ACCOUNTS

A. R. POWLEDGE

Substantial savings have been made through the establishment of a central accounting office.

Whereas in the past accounts of the divisions of the State Department of Agriculture were handled by the various divisions, the system now employed makes it possible for greater efficiency and economy of operation.

The program of the Division is correlated with the system employed by the Budget Bureau.

Fertilizer, feed, agricultural lime, seed and insecticide tax tags, seed and other licenses are issued through the Division.

A financial statement of the Department follows:

FINANCIAL STATEMENT

STATEMENT OF DISBURSEMENTS

July 1, 1938-June 30, 1940

Administration	*1939-40*	*1938-39*
Board Agriculture	$ 1,689.20	$ 2,378.45
Salary Commissioner	6,000.00	5,250.03
Salaries Staff	20,822.00	19,299.50
Supplies	800.10	1,617.61
Tags	7,974.13	7,859.58
Postage	1,150.41	1,049.29
Telephone & Telegraph	820.21	624.87
Express, Freight, Etc.	141.54	109.73
Travel	1,667.36	1,900.00
Printing Forms	346.36	396.49
Printing Bulletins	5,156.60	4,872.33
Repairs	99.61	102.13
General Expense	89.40	81.07
Equipment	1,695.52	370.85
Legislative Representative in Washington, D. C.	500.00	500.00
Total	$ 48,952.44	$ 46,411.93

Inspection	*1939-40*	*1938-39*
Salaries and Wages	$ 6,634.00	$ 4,692.00
Salaries and Wages—Extra	4,250.00	4,820.00
Supplies	126.62	69.51
Postage	100.00	84.00
Freight and Express	307.30	338.84
Field Travel	19,749.90	17,131.50
Total	$ 31,167.82	$ 27,135.85

Markets	*1939-40*	*1938-39*
Salary, Chief	$ 3,600.00	$ 3,600.00
Salaries Staff	28,159.74	17,632.67
Salaries Extra	288.67	271.50
Supplies	999.25	384.78
Postage	368.00	137.00
Telephone and Telegraph	460.21	549.91
Express	30.65	------
Travel	9,904.83	4,769.66
Printing	158.32	------
Repairs	46.79	8.55
Market News Service	958.54	738.05
Subscriptions	147.23	116.00
Equipment	833.17	276.99
Leased Wire	1,148.92	911.20
Tobacco Demonstration	------	599.43
Total	$ 47,104.32	$ 29,995.74

Credit Union	*1939-40*	*1938-39*
Salary Chief	$ 3,000.00	$ 3,000.00
Salaries Staff	2,910.00	2,727.50
Office Supplies	73.16	44.39
Postage, Telephone and Telegraph	111.31	118.51
Field Travel	2,272.56	2,365.68
Printing	86.41	307.49
Equipment	92.45	49.58
	$ 8,545.89	$ 8,613.15
Refund from General Fund	4,272.95	4,306.58
Total	$ 4,272.94	$ 4,306.57

Dairy	*1939-40*	*1938-39*
Salary Chief	$ 3,438.00	$ 3,438.00
Travel Expense	1,430.00	1,231.47
Supplies	37.50	46.88
Postage, Telephone and Telegraph	99.75	80.28
Printing	28.86	22.77
Equipment	25.15	49.92
Total	$ 5,059.26	$ 4,869.32

Entomology	*1939-40*	*1938-39*
Salary Chief	$ 3,438.00	$ 3,438.00
Salaries Staff	10,800.00	10,971.50
Office Supplies	89.84	53.34
Scientific Supplies	52.69	28.33
Postage	122.00	221.00
Telephone and Telegraph	83.20	91.74
Express and Freight	3.31	2.88
Field Travel	4,434.93	4,701.70
Printing	36.03	2,459.32
Subscriptions	98.77	110.69
Equipment	------	23.70
Total	$ 19,158.77	$ 22,102.20

Seed Laboratory	*1939-40*	*1938-39*
Salary Chief	$ 3,300.00	$ 3,300.00
Salaries Staff	12,705.20	12,509.92
Office Supplies	120.01	155.15
Scientific Supplies	90.11	50.08
Postage	300.00	371.00
Telephone and Telegraph	48.36	78.66
Express and Freight	1.43	------
Field Travel	1,999.49	3,551.18
Printing	242.86	472.57
Repairs	26.87	3.23
Office Equipment	------	50.00
Total	$ 18,834.33	$ 20,541.79

Analytical	*1939-40*	*1938-39*
Salary Chief	$ 3,438.00	$ 3,438.00
Salaries Staff	42,877.83	43,051.50
Office Supplies	260.12	446.02
Scientific Supplies	2,399.06	2,849.97
Postage	475.00	500.00
Telephone and Telegraph	185.72	190.56
Express and Freight	66.83	90.43
Travel Expense	483.12	560.30
Printing	450.00	918.79
Repairs	210.23	199.00
Laundry	4.06	2.29
Office Equipment	------	175.50
Scientific Equipment	300.00	943.18
Total	$ 51,149.97	$ 53,365.54

Crop Statistics	*1939-40*	*1938-39*
Salary Chief	$ 433.32	$ 2,600.00
Salaries Staff	12,926.00	12,239.34
Salaries Extra	3,879.00	2,770.00
Office Supplies	123.55	100.39
Postage	40.30	33.00
Telephone and Telegraph	128.29	96.97
Field Travel	857.40	903.70
Printing Publications	2,033.76	1,889.32
Repairs	28.53	41.43
Subscriptions	10.00	------
Equipment	540.49	592.91
Total	$ 21,000.64	$ 21,267.06

Museum	*1939-40*	*1938-39*
Salary Chief	$ 3,438.00	$ 3,438.00
Salaries Staff	4,854.00	4,989.00
Salaries Extra	26.33	249.58
Office Supplies	302.64	290.11
Postage	55.00	55.00
Telephone and Telegraph	48.97	38.49
Express	3.65	13.19
Field Travel	217.95	299.48
Printing	18.46	85.39
Subscriptions	34.50	45.00
Equipment	257.22	675.86
Total	$ 9,256.72	$ 10,179.10

Serum	*1939-40*	*1938-39*
Supplies	$ 496.07	$ 254.04
Postage	403.18	351.00
General Expense	------	12.48
Serum to be Resold	12,786.93	13,380.36
Total	$ 13,686.18	$ 13,997.88

Veterinary	*1939-40*	*1938-39*
Salary Chief	$ 3,600.00	$ 3,600.00
Salaries Staff	28,140.52	20,814.17
Salaries Extra	8,955.87	5,987.00
Office Supplies	479.47	374.92
Postage	84.49	90.00
Telephone and Telegraph	172.44	157.19
Express	63.30	35.58
Field Travel	22,091.00	16,403.73
Printing	52.40	345.44
Repairs	7.25	4.00
General Expense	114.46	48.21
Equipment	35.28	275.31
Clinic on Mastitis	500.00	------
Total	$ 64,296.48	$ 48,135.55

Test Farms	*1939-40*	*1938-39*
Salary Chief	$ 3,600.00	$ 3,600.00
Salaries Staff	61,083.11	56,829.72
Supplies and Materials	17,882.45	18,901.01
Postage, Telephone, Telegraph	1,703.56	1,772.94
Travel Expense	3,449.94	3,776.93
Printing and Binding	90.98	251.72
Operation Motor Vehicle	2,751.54	2,579.05
Light, Power, Water	1,811.89	1,678.76
Repairs and Alterations	2,231.73	3,271.28
General Expense	1,398.41	1,192.05
Equipment	5,522.41	6,620.51
Additions and Betterments	13,050.30	11,726.20
Extraordinary	673.12	328.50
Total	$115,249.44	$112,528.67

Miscellaneous	*1939-40*	*1938-39*
Custodial	$ 6,480.00	$ 6,480.00
Farmers' Convention	300.00	300.00
State Fair Exhibits	513.14	2,449.79
Exc. Indian Mound	186.19	296.01
Total	$ 7,479.33	$ 9,525.80

Rabies	*1939-40*	*1938-39*
Rabies	$ 374.41	$ 785.00

Japanese Beetle Work	*1939-40*	*1938-39*
Salaries and Wages	$ 4,078.20	------
Supplies and Materials	12,646.80	------
Travel	733.02	------
Salaries and Wages—Trap Tenders	1,424.00	$ 2,066.02
Total	$ 18,882.02	$ 2,066.02

Blister Rust Control	*1939-40*	*1938-39*
Reserve	$ 4,879.60	$ 4,981.40

Soil Testing	*1939-40*	*1938-39*
Salary Director	$ 3,672.42	------
Salaries Staff	2,630.17	------
Office Supplies	256.31	------
Postage	237.25	------
Telephone, Telegraph, Express	81.68	------
Travel	943.89	------
Scientific Supplies	2,502.77	------
Laboratory Equipment	3,992.31	------
Office Equipment	539.43	------
Total	$ 14,856.23	
Total	$495,660.90	$432,195.42
Refund from General Fund	4,272.95	4,306.58
Total	$499,933.85	$436,502.00
Experiment Station	$ 26,350.00	$ 26,350.00
Seed Improvement Work	$ 4,550.00	$ 4,550.00

STATEMENT OF RECEIPTS

JULY 1, 1938-JUNE 30, 1940

	1939-40	*1938-39*
Fertilizer	$271,181.20	$241,786.85
Cotton Seed Meal	23,259.78	17,478.90
Feed	90,294.23	72,938.10
Seed Licenses	18,598.66	19,588.00
Condimental Feed	640.00	960.00
Serum	15,583.01	14,497.62
Costs	2,112.24	738.64
Legumes	-------	-------
Linseed Oil	1,767.40	2,201.11
Bleached Flour	13,725.00	12,630.00
Bottling Plants	2,130.00	2,170.00
Ice Cream	2,040.00	2,070.00
Fertilizer Registrations	2,700.00	2,840.00
Insecticides	2,380.10	907.85
Branding Cattle	-------	-------
Test Farms	37,838.84	45,219.75
Bakeries	1,610.00	1,470.00
Chicken Tests	17,626.96	15,372.74
Credit Union	-------	-------
Seed Tags	4,783.44	4,137.26
Seed Tests	1.50	3.00
Inspection Entomology	2,565.08	2,932.95
Dynamometer	166.00	506.45
Oleomargarine	2,700.00	3,096.59
Land Plaster	2,417.70	1,315.18
Rabies	775.23	1,140.65
Agricultural Lime	2,206.99	2,789.15
Miscellaneous	634.40	50.38
Feed Registrations	3,051.00	107.00
Canned Dog Food Registrations	425.00	30.00
Dog Food Stamps	3,194.05	105.90
Soil Containers	307.72	-------
Total	$526,715.53	$469,084.07

Balance July 1, 1939	$322,265.30
Balance July 1, 1940	$322,419.93

STATE WAREHOUSE SYSTEM
FINANCIAL STATEMENT
STATEMENT OF DISBURSEMENTS
JULY 1, 1938-JUNE 30, 1940

	1939-40	*1938-39*
Salary Superintendent	$ 3,600.00	$ 3,600.00
Salaries Staff	13,206.00	11,845.17
Salaries (N. C. Cooperatives)	3,300.00	3,180.00
Office Supplies	158.59	74.79
Postage	184.50	257.00
Telephone and Telegraph	208.05	190.46
Express	250.00	313.96
Field Travel	2,682.15	2,199.05
Printing Receipts and Tags	3,232.31	4,030.10
Equipment Repairs	11.12	3.00
General Expense	289.77	624.16
Office Equipment	18.90	109.02
Fire Insurance	50.00	164.00
Bonding	432.25	592.50
Additions and Betterments	.....	23,603.00
Total	$ 27,623.64	$ 50,786.21

STATE WAREHOUSE SYSTEM
STATEMENT OF RECEIPTS
JULY 1, 1938-JUNE 30, 1940

	1939-40	*1938-39*
Interest on Bonds	$ 14,528.75	$ 14,527.50
Interest on Loans	15,390.52	13,111.54
Leases	276.00	290.00
Sale Warehouse Supplies	3,996.33	5,252.28
Sale Loose Cotton	235.21	720.07
Total	$ 34,426.81	$ 33,901.39
Treasurer's Cash, June 30, 1940, Supervision Account		$ 44,160.80
Treasurer's Cash, June 30, 1940, Principal Fund		$ 39,954.30

WEIGHTS AND MEASURES
STATEMENT OF DISBURSEMENTS
JULY 1, 1938-JUNE 30, 1940

	1939-40	*1938-39*
Salary—Superintendent	$ 2,960.00	$ 2,760.00
Salary—Inspectors	6,763.16	4,860.00
Salaries—Extra	51.00	.....
Supplies	1,854.92	98.59
Postage	53.00	58.49
Telephone and Telegraph	129.10	100.00
Travel	5,762.28	4,900.53
Printing	67.93	67.33
Equipment	160.50	225.07
Workmen's Compensation	752.29	.....
Total	$ 18,554.18	$ 13,070.01

BANG'S DISEASE

STATEMENT OF EXPENDITURES

JULY 1, 1938-JUNE 30, 1940

	1939-40	*1938-39*
Indemnity Diseased Slaughtered Livestock	$ 20,320.93	------

TUBERCULOSIS AND GLANDERS

JULY 1, 1938-JUNE 30, 1940

	1939-40	*1938-39*
Indemnity Diseased Slaughtered Livestock	$ 162.50	$ 603.22

N. C. STATE FAIR

FINANCIAL STATEMENT

STATEMENT OF DISBURSEMENTS

JULY 1, 1938-JUNE 30, 1940.

	1939-40	*1938-39*
Salary Manager	$ 3,600.00	$ 3,600.00
Salaries and Wages	9,239.00	12,051.09
Supplies and Materials	586.63	1,091.10
Postage, Tel., and Express	649.00	679.33
Travel Expense	------	47.35
Printing and Binding	1,962.43	1,810.07
Motor Vehicle Operation	120.45	156.85
Light, Power, Water	922.52	986.04
Repairs and Alterations	8,440.69	1,924.57
General Expense	39,801.20	38,207.34
Equipment	159.79	332.95
Insurance and Bonding	2,989.16	------
Total	$ 68,470.87	$ 60,886.69

N. C. STATE FAIR

STATEMENT OF RECEIPTS

JULY 1, 1938-JUNE 30, 1940.

	1939-40	*1938-39*
General Admission	$ 25,716.51	$ 27,947.33
Grandstand Admission	11,545.65	13,665.57
Auto Parking	5,077.50	5,771.95
Carnival Privileges	10,142.63	15,548.77
Sale of Advertising	1,640.00	1,694.75
Sale of Exhibit Space	2,355.25	2,488.60
Rent of Eating Booths	2,949.50	3,233.00
Concessions and Privileges	8,753.22	4,405.95
Entry Fees	1,088.25	570.00
Exhibitor's Tickets	------	630.50
Miscellaneous	361.38	261.97
Rental of Buildings	933.33	315.00
Interest on Bonds	770.00	64.12
Total	$ 71,333.22	$ 76,597.51
Balance July 1, 1939		$ 34,583.40
Balance July 1, 1940		$ 37,965.50

TAX RATE ON FEEDING STUFF
TAGS AND STAMPS
25¢ Per Ton

TAX TAGS:

Denomination of Tags	*Cost Per Tag*			*Price Per 1,000 Tags*
100 lb.	$.0125	(1¼¢)	Packed 1,000 to Box	$12.50
75 lb.	.09375	(15/16¢)	Packed 1,000 to Box	9.38
50 lb.	.00625	(5/8¢)	Packed 1,000 to Box	6.25
25 lb.	.003125	(5/16¢)	Packed 1,000 to Box	3.13

TAX STAMPS:

Denomination	*Cost Per Stamp*			*Price Per 1,000 Stamps*
100 lb.	$.0125	(1¼¢)	Bound 1,000 to Book	$12.50
75 lb.	.09375	(15/16¢)	Bound 1,000 to Book	9.38
50 lb.	.00625	(5/8¢)	Bound 1,000 to Book	6.25
25 lb.	.003125	(5/16¢	Bound 1,000 to Book	3.13
10 lb.	.00125	(1/8¢)	Bound 1,000 to Book	1.25
8⅓ lb.	.001041		Bound 960 to Book	1.00

In placing your orders please state whether you want *stamps* or *tags*.

DIVISION OF TEST FARMS

F. E. MILLER

It is the purpose of this report to present the program of work on the six outlying Experiment Stations, with brief statements of the results secured from the many projects underway. The report also gives the important improvements made during this biennium and shows that progress has been made.

COÖPERATION

The experimental work on the Stations, consisting of 140 projects, is handled in coöperation with the Agricultural Experiment Station of the State Agricultural College of the University of North Carolina, and in many instances with the U. S. Department of Agriculture. The coöperating agencies have aided in planning, financing, and carrying forward the experiments. All coöperative investigations receiving Federal support are covered by formal memorandums of agreement, which are signed by the executive officers of the agencies contributing toward the project.

The research work on the Station Farms, in the laboratories, and elsewhere, is under the control of the Director of the North Carolina Agricultural Experiment Station. The Director of Test Farms also serves as Assistant Director of the Experiment Station.

GENERAL

During the biennium much improvement work has been completed in the way of repairing and painting buildings, clearing and draining lands, and obtaining new farm machinery and implements. The Station farms as a whole are in better condition than in any previous period. With the new office and laboratory building at the Tobacco Station, tobacco research work has been enlarged, particularly from the standpoint of insect and disease control measures. At the Upper Coastal Plain Station, peanut investigations have been more than doubled. At the present time approximately fifty acres are in peanut experiments. The cotton and tobacco experiments have either been completed or revised and moved to locations on the new farm which was purchased in the fall of 1937. The dairy research program at the Coastal Plain Station has been revised and considerably enlarged to take in annual grazing studies. This was made possible by the purchase of 128 acres of land and the building of new dairy barns with the help of the W. P. A. The small grain work at the Piedmont Station has been outstanding. Several new disease resistant strains of barley and oats have been developed and

these are available for distribution to growers. The new "Carala" variety of wheat has also been developed and is being distributed in a small way. Beef cattle work at the Blackland Station will be expanded due to a Federal appropriation which is available July 1, 1940. This new work will deal primarily with the study of grazing forest lands with beef cattle and will be handled in coöperation with the Bureau of Animal Industry and the Forestry Service of the U. S. Department of Agriculture. The principal new project at the Mountain Station is the cross-breeding broiler experiment. To take care of this work, two new poultry buildings and the necessary equipment have been added. Four 22-ton experimental silos were donated by the T. V. A. for the purpose of testing legume and cereal ensilage.

The Stations have continued to hold the Annual Farmers' Field Days, which are attended each year by approximately twenty thousand people. Other special meetings are held during the year, such as Small Grain Day at the Piedmont Station, Livestock Day at the Blackland Station, Peanut Day at the Upper Coastal Plain Station, Poultry Day at the Mountain Station, and Tobacco Conference at the Tobacco Station. In addition to these meetings, County Agents and teachers of Vocational Agriculture bring groups of farmers to study the various experiments. Visitations to the Stations are increasing each year, which emphasizes the growing popularity of the program of work on the different Station farms.

RESEARCH

Following is a progress report, by Station. The report on each experiment gives the name of the specialist leader and it is understood that the Assistant Director in Charge of the Station contributes to each project in addition to his regular duties as administrative officer of the Station farm.

BLACKLAND STATION—WENONA, N. C.

J. L. REA, JR., Assistant Director in Charge

Station Established in 1912.

Area of Station, 362 Acres. Soil Type: Peat and Muck.
Elevation, 16 feet above sea level.

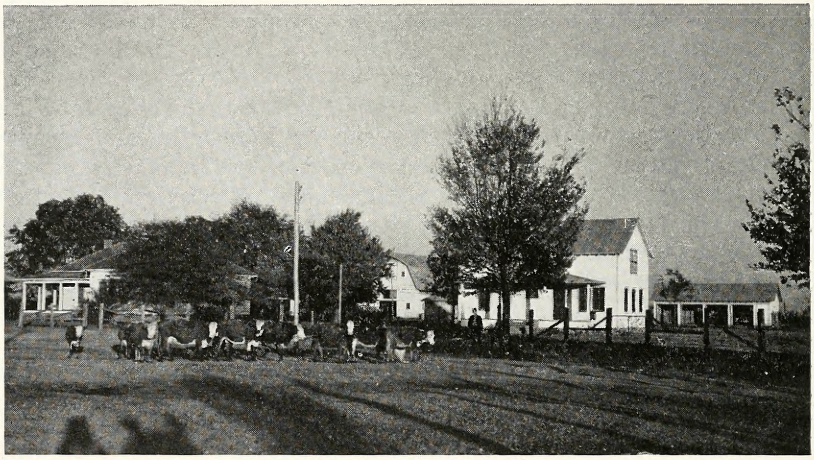
Climatological Data for 1939

Mean Annual Temperature, 60.5 degrees Fahrenheit.
Annual Rainfall, 48.98 inches. Total Snowfall, 1.0 inches.

GENERAL

During the past two years, more interest has been shown in the production of livestock than in any similar period since the Station has been established. With a gradual decrease in the

acreage cultivated in the so-called money crops, a substitute is being sought by balancing crop production with livestock production. The experimental work at this Station is concerned primarily with the production of feed crops and livestock and the farmers of this section visit the Station for information along these lines. It is gratifying to report that the Station is becoming more useful each year and that the farmers of this section are taking advantage of the opportunity to put into practice the facts that have been found at the Station.



SUPERINTENDENT'S DWELLING AND OFFICE BUILDING, BLACKLAND EXPERIMENT STATION.

AGRONOMY

Coöperating with the N. C. Agricultural Experiment Station

Three Year Rotation of Corn, Oats, and Irish Potatoes, With the Oats and Irish Potatoes Being Followed by Soybeans Turned Under for Soil Improvement (E. R. Collins): The rotation and location is the same as that of the old phosphate studies that were carried on for a period of more than fifteen years. Under the new plan, each old plat is divided into five small plats being fertilized differently. Along with the results from the new fertilizer treatments, the residual effects from the former treatments are being studied also. This work was begun this year and only the results with Irish potatoes and oats have been secured. The results with some of the treatments look encouraging.

Rotation Experiment (E. R. Collins): This experiment consists of a series of ten plats with each large plat subdivided into ten small plats which are fertilized differently. Each fertilizer

treatment is replicated five times. The rotation used is as follows:

(1) a. Corn b. Oats (combined) Soybeans (seed).

(2) a. Corn and Soybeans (same rows).

(3) a. Corn b. Soybeans (seed).

(4) a. Corn and Soybeans (same rows) Vetch as winter legume.

(5) a. Corn b. Soybeans (seed) c. Rye planted October and harvested.

The object of the experiment is to work out a suitable crop rotation on black land as well as the proper fertilization for the crops under consideration. This experiment was started in 1939 and the results so far secured have not been sufficient to give any indication as to the outcome of the experiment.

Fertilizer and Lime Requirements for Corn and Soybeans Grown in Rotation, the Soybeans being Utilized for Seed in One Series and for Hay in the Other (E. R. Collins): Results show that potash is still the most essential plant food for both corn and soybeans, and that phosphate when used liberally under both corn and soybeans was injurious.

Soybean Varieties (R. L. Lovvorn): A number of the most promising varieties of soybeans were tested for hay and seed. Results of the first year show that Wood's Yellow was the heaviest yielder of seed and the Missoy the heaviest yielder of hay. There were a number of other varieties in the test that showed promise of being heavy yielders of seed and hay.

Hybrid Corn (Paul H. Harvey): A test of the various corn hybrids that were considered suitable for this section was conducted during the 1939 growing season. Our self-pollenized local varieties were also put in the test. Only one or two of the hybrids showed any promise, while some of our standard self-pollenized varieties yielded well. The results from the one year test seem to indicate that we do not have a dependable hybrid corn developed that is suitable to this section.

Small Grains (G. K. Middleton): A small grain test of oats, barley, rye, and wheat was put in in the fall of 1939. Final results have not yet been compiled.

Seed Corn Selections (Paul H. Harvey): Highland Horsetooth, a white corn and Jarvis' Golden Prolific yellow corn are being field selected as in the past twelve years. The selections are made for uniformity of type, corn root rot and weevil resistance. Both of these varieties have shown up well in the field and under test.

Sericea Lespedeza (R. H. Stitt—B.P.I.): A strain of Sericea Lespedeza that is low in tannic acid is being grown at the Station. Cuttings and analysis are run several times each year to determine the amount of tannic acid present.

FORESTRY

Coöperating with the N. C. Agricultural Experiment Station
R. W. GRAEBER

Three acres of partly cleared land have been planted to cypress, yellow poplar, and white ash. The object being to determine which of these trees shows the most promise in a reforestation project. The plantings will probably be increased with the most suitable trees later on.

LIVESTOCK

Coöperating with the N. C. Agricultural Experiment Station and the Bureau of Animal Industry
EARL H. HOSTETLER and J. E. FOSTER

Comparison of Protein Supplements for Fattening Pigs—Fish Meal Versus Peanut Meal 3/4 and Ground Soybean Hay 1/4: Gains have been greater and cheaper in the fish meal group. Pigs consume more peanut meal than is needed to balance their ration even though the soybean hay is added to reduce the amount of peanut meal consumed.

Cost of Raising Pigs to Weaning Age: Data is kept on the cost of raising pigs to weaning age. The size of the litter is the greatest factor in the cost of raising pigs to weaning age. The cost per pig goes down as the number of pigs raised in the litter increases.

HERD AND CATTLE BARNS AT BLACKLAND EXPERIMENT STATION.

Beef Cattle Management Studies: (1) Cost of Wintering. All cattle are weighed at twenty-eight day intervals to determine weights and gains. By using ungrazed reed areas, corn field and soybean field gleanings and rye pasture during the winter, the herd is carried with little additional feed. The severity of the winter is the determining factor as to the amount of dry feed necessary to carry the cattle in good condition through the winter.

(2) Cost of Summering. Results show that the highest rate of gains is made on reed pasture from May 1 to August 1. Pasture land rental, salt and minerals, and the cost of upkeep on fencing constitute the major expense items in the summering costs of cattle.

Mineral Studies with Sheep: The flock is divided into two equal groups with one group receiving a mineral mixture of steam bone meal, 40 lbs.; limestone, 40 lbs.; salt, 17½ lbs.; iron sulphate, 2.4 lbs.; and copper sulphate, .1 lb. The other group received salt alone as their mineral.

The group receiving mineral dropped a higher percentage of twins, stronger lambs, and raised more lambs to weaning age than did the salt group.

Effects of Shearing on Summering Lambs: The lambs were divided into two equal groups on June 15. One group was sheared at that time. The results showed that the sheared group made greater gains during the summer and remained more thrifty than the unsheared group.

Comparison of Copper Sulphate and Nicotine Sulphate with Phenothiazine for the Control of Internal Parasites in Sheep: This project was started on May 1 of this year and has not been underway long enough to obtain any definite results.

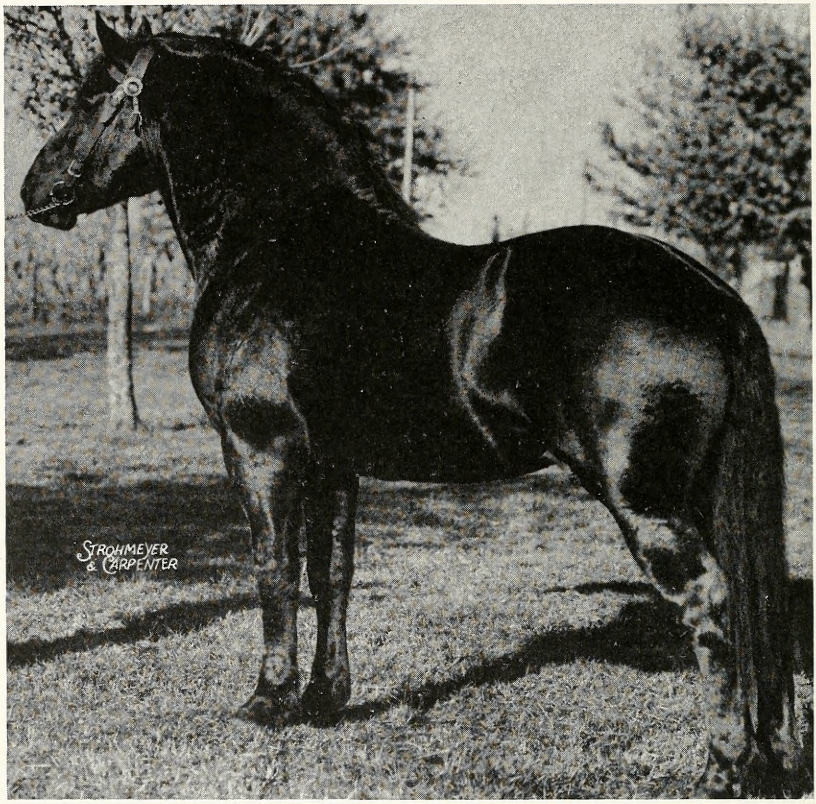
Improvement of the Family Milk Cow by the Use of Purebred Guernsey Sire: For a number of years the Station has kept for community service a purebred Guernsey sire to improve the quality of the family cows in the Station area. The fourth Guernsey sire is now at the Station. This sire is Wakefield Nero 268281. He is a line bred Maxim bull and should step up the production on the grade cows.

This project has been very popular and has possibly done as much in the way of improvement for which it was intended as anything undertaken by the Station.

Work Stock Improvements: The Station is now keeping six Percheron mares and one Percheron stallion which are used to perform the work on the farm as well as to produce colts for replacement. A surplus of young horses is now being raised and

transferred to the other Stations as the need for work stock arises.

Farmers that are interested in raising their own work stock are using the services of the Station stallion. A number of promising young animals are now to be found in Washington and adjoining counties sired by the Station stallion.



BLACKLANDS DONNOT, PERCHERON STALLION, BLACKLAND EXPERIMENT STATION.

Cost of Producing Draft Colts (J. L. Rea, Jr.): The object of this project is to determine the cost of producing draft colts to work age. Records are kept on the amount of grain and hay consumed, hours worked by the mares, and the number of hours of pasture each day. All animals are weighed at twenty-eight day intervals to determine their weights and gains.

PUBLIC RELATIONS

The Annual Livestock Day is held at the Station each spring before the hogs and cattle are shipped that have been on experi-

mental feeding. From two to three hundred people attend these meetings which are held only for those who are interested in livestock.

In addition to the annual Livestock Day, we are continuing to hold the Annual Farmers Field Day each summer. From 1500 to 2000 people attend these meetings each year.

The State Highway and Public Works Commission has improved the road leading from the main road to the Station during the summer. The road has been sanded and shelled until it is now passable under almost any weather conditions. It is hoped that the road will be further improved within the near future so that the Station might be more useful and accessible during the year.

COASTAL PLAIN STATION—WILLARD, N. C.

CHAS. T. DEARING, *Assistant Director in Charge and Associate Horticulturist, U. S. D. A.*

Station Established in 1905.

Area of Station, 445 Acres. Soil Type: Norfolk Fine Sandy Loam.
Elevation, 51 feet above sea level.

Climatological Data for 1939

Mean Annual Temperature, 63.8 degrees Fahrenheit.
Annual Rainfall, 51.58 inches. Total Snowfall, T.

PUBLIC RELATIONS

Through public meetings, research activity, demonstrations, correspondence and phone service, day by day visitation of the public and advisory visits by Station workers to farms, this Station continues to exert a major influence on the agriculture of Southeastern North Carolina. The Annual Field Day has been continued during the biennium. Two very successful days were held with attendance exceeding eight thousand people each year. These people came principally from the ten counties of Southeastern North Carolina. In 1938, Mrs. Clyde R. Hoey was present as principal speaker and subjects of special interest to farm women were stressed. In 1939, the new dairy developments of the Station were featured by a program emphasizing dairy subjects.

Two Annual Field Days for negro farmers have also been held with appropriate subjects discussed. The attendance at these events has averaged about three thousand people each year. In the Spring of 1939, a special strawberry day was held for farmers and in the Spring of 1940, a conference of research workers interested in small fruits from all the southern and eastern State Experiment Stations was held. Each year the vocational agricultural students from schools of the Southeast have gathered

here for a district stock judging contest. The Station offered pedigreed dairy, poultry, and swine stock as prizes on these occasions. The Station has also furnished judges for fairs and flower shows and speakers for agricultural gatherings.

IMPROVEMENTS

Under the WPA project, referred to in the last report, and a supplemental project, the Station has constructed a modern dairy establishment consisting of a large cow barn, large calf and maternity barn, bull barn, milk house, and herdsman's house. In addition, much has been done to improve the new land area recorded as purchased in the last report. Roads have been built, bridges constructed, terraces built, fences erected, sewerage and water systems put in, grounds beautified about buildings, and trees and stumps removed from field areas. The land has also been limed and fertilized. Modern dairy equipment has been installed and a new research program has been established in coöperation with the U. S. Bureau of Dairying. The State contributed approximately $14,000 to this dairy improvement project.

Under a superseding WPA project, the Station has been renovating the old dairy site after moving into the new dairy. The old barn has been turned into machinery storage space, which can also be used as a pavilion for the holding of farmers' meetings. The old bull sheds have been turned into corn cribs and the surrounding grounds have been cleared of unsightly dairy fences and beautified. The adjoining hog lots have been cleared away and modern sanitary lots constructed on a new site separate from other departments. The milk house has been reconstructed as a two car garage.

A new improvement program in coöperation with the WPA is now underway and about fifty per cent complete at the end of the biennial period. Under this new project, repairs have been made to the Superintendent's, Foreman's, and Assistant Foreman's houses consisting of such work as replacement of rotted sills and joists, rebuilding of piers and porches, and the two latter houses were painted both outside and inside. Under this same project, a boiler room has been constructed at the boarding house preliminary to the installation of steam heat, and, as a separate Station project, this house was also renovated by completely painting the interior in the summer of 1939. Other buildings under construction at the present time are a smoke house, a grain storage house for use in storing seed, and a combination carpenter and blacksmith shop. This latter might also be described as a farm shop building. All of these buildings are of permanent brick and hollow tile construction. Under this same project, the

front grounds around the dairy site have been landscaped and planted. An adequate tile drainage system has been constructed through the dairy experimental field area, using 10 inch tile for the main and 6 inch tile for the laterals. The remainder of stumps on the new dairy site have been removed and terraces have been constructed on those portions of the dairy site which required same. The main drainage canal of the Station has been widened and deepened and a pack house has been moved off the dairy area to a new site and reconstructed as a camp house for strawberry pickers. The new dairy milk house has also been screened under this project. Additional land (about four acres) is to be cleared and fire lanes are to be cleaned out and a considerable amount of Station road construction work and improvements are to be made. Wagon scales are to be constructed and fencing is to be put in on the new dairy area under this same project before it is completed. In all, the Station, through coöperation with the WPA, has virtually completed an improvement program which has put this Station in an excellent state of repairs and also given to it a large number of improvements which will greatly facilitate its work.

RESEARCH

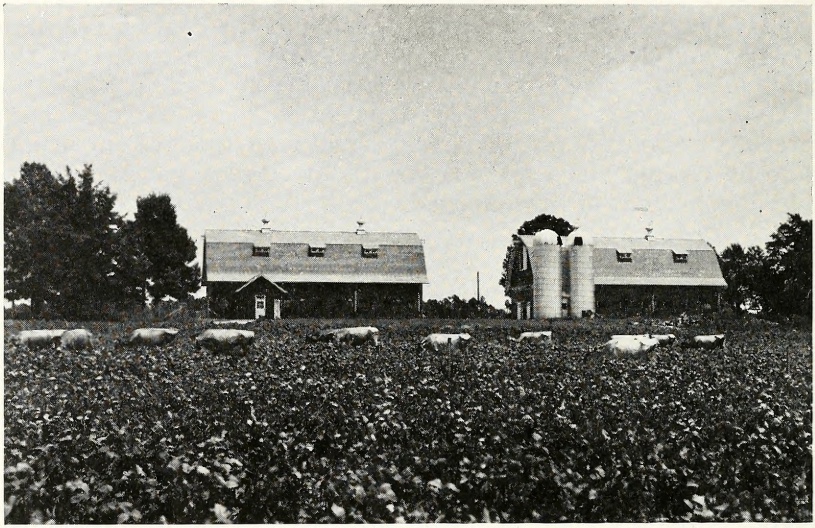
The research work of this Station is a broad diversified one, having in mind the development of profitable lines of agriculture other than the growing of cotton and tobacco. No tobacco has ever been grown at the Station and no cotton has been grown since 1911. On account of limited area for the production of feed stuffs, this Station does not attempt to carry extensive projects along some obvious lines of livestock production. The hog work, for example, is left largely to other Stations. The two principal livestock activities are the dairy work and the poultry work.

DAIRY

Coöperating with the Bureau of Dairy Industry, U. S. Department of Agriculture, E. W. FAIRES, *Agent, and the N. C. Agricultural Experiment Station,* C. D. GRINNELLS

The object of the coöperative dairy work is to conduct dairy cattle breeding investigations and investigations of dairy cattle feeding and herd management problems peculiar to the lower coastal plain region. Investigational work, planned and prosecuted jointly, is of two types. First, the breeding of registered Jersey cattle that will be pure in their inheritance for the hereditary factors that determine high levels of production; and second, investigations of pasture problems and of the curing and preservation of roughage in the most desirable form for feeding.

The breeding work is to be accomplished by the continued use for generation after generation of sires that have shown by the producing ability of their offspring that they are homozygous for factors determining high levels of production. A registered Jersey herd consisting of twelve bred heifers and a proved-for-pro-



DAIRY COWS GRAZING ON SOYBEANS AT THE COASTAL PLAIN EXPERIMENT STATION. THIS PICTURE ALSO SHOWS THE REAR OF THE NEW DAIRY BARNS. THE SOYBEANS IN THE FOREGROUND HAVE BEEN GRAZED AND ARE NOW GROWING BACK. THEY WILL BE GRAZED AT INTERVALS FOUR TIMES DURING THE SUMMER.

duction sire added in 1939 as a contribution from the U. S. Department of Agriculture to the already established registered Jersey herd of the N. C. Department of Agriculture, is being used in these investigations. Ownership of the cattle is divided between the coöperating agencies, but the herd is managed as a single unit in all investigational work. At present the herd consists of sixty-three animals divided as follows: 30 cows of milking age, 19 heifers, 10 calves, 2 mature bulls, and 2 yearling bulls. The herd has passed negative tests for both bangs disease and tuberculosis and is, accordingly, accredited for good health. In order that production records will be official, the herd is enrolled in the herd improvement registry test of the American Jersey Cattle Club. All milking cows are on continuous test. On May 31, 1940, the herd completed the eighth consecutive testing year. Averages for the first seven years are as follows: Average number of cows in herd, 15.95; average number of cows in milk, 13.57; average yearly production, 6635 lbs. milk, 334.53 lbs. butterfat. Under the herd breeding investigation program at least one satis-

factory production record is secured from all cows for comparison. This record is obtained during the first lactation period unless some condition develops that might cause a cow to produce abnormally. In this event a latter lactation will be used. After an official record is obtained, all cows will be available for investigational feeding trials and for use grazing on crops in the pasture studies.

The investigational work relating to feeds and pastures for dairy cattle is intended to determine the value of a succession of annual or perennial pasture crops and to permit working out an extended pasture grazing system and an economical feeding ration. This work is just getting well underway. It is planned to plant a series of fields to a group of crops suitable for grazing, for hay production, or for making ensilage. Grazing of available crops will receive first consideration and when crops in season produce more materials than can be satisfactorily grazed, the surplus will be used either for hay or for ensilage needed in feeding the cattle at such times when there is no available grazing material in the field. Crops selected for use are soybeans, combinations of soybeans and pearl millet, and soybeans and sudan grass, pearl millet, sudan grass, lespedeza and kudzu for summer crops, and for winter and early spring and fall crops, oats, rye, barley, Oregon, or Common, and Hairy vetches, Ladino, Strawberry, Crimson, and Burr clovers, and Reeds Canary grass. In addition to these crops, trial planting of other crops will be made from time to time to determine their adaptability in such a system. An area is set aside as a trial ground. During the biennium, investigations with the above crops have been largely preliminary as it takes time to properly inoculate the soils and bring the soils of a worn out tenant farm to the point of proper production. Satisfactory results, however, have been obtained already from soybeans for grazing, hay production, and ensilage; from lespedeza for grazing and hay; from pearl millet, sudan grass, Oregon vetch, oats, Crimson clover seeded in permanent pasture sod, and in combination with rye, barley and vetch for grazing crops. Combinations of oats and Hairy vetch and oats and Crimson clover have made satisfactory hay. Kudzu set in the spring of 1940 has made satisfactory development, but not sufficient for the crop to be grazed. This kudzu, however, is already proving useful in preventing soil erosion on the area on which it has been planted. Combinations of soybeans and pearl millet and soybeans and sudan grass were not satisfactory during the summer season of 1939. The soybeans made satisfactory growth, but the pearl millet and sudan grass did not. Competition from the soybeans was too great for the latter crops which were seeded following the second cultivating of the soybeans.

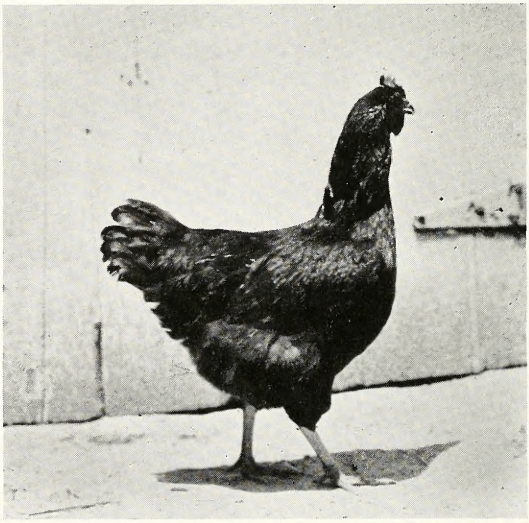
California Burr clover seeded in 1939 did not develop sufficiently to afford grazing, apparently due to lack of sufficient inoculation and poor soil fertility. Strawberry and Ladino clovers are not yet established well and Reeds Canary grass has not germinated satisfactorily. The Station's permanent pasture that is already entirely carpet grass sod has afforded satisfactory grazing.

POULTRY

Coöperating with the N. C. Agricultural Experiment Station,
R. S. DEARSTYNE and C. O. BOLLINGER

In addition to maintaining a demonstration poultry plant, which is operated on good business principles, this plant is used for poultry research projects. At the present time there are two principal projects underway. One line of research has to do with the breeding of superior poultry stock of the Rhode Island Red breed; the other project relates to studies of sources of protein feed. At the present time, studies are being made on peanut meal.

In the breeding work, records are being kept on all birds as to their production and pedigreed stock is being developed to the point that we are now studying families of birds as well as the



THE HEAD OF AN OUTSTANDING POULTRY FAMILY MAKING A GREAT RECORD IN THE POULTRY YEAR ENDING NOVEMBER 1, 1940. THIS HEN IN HER PULLET YEAR PRODUCED 240 EGGS. SEVENTEEN OF HER DAUGHTERS ARE BEING TRAPPED IN PROGENY TESTING. ALL HAVE EARLY SEXUAL MATURITY, PRODUCE EGGS WEIGHING MORE THAN THE STANDARD, AND OVER FIFTY PER CENT OF THESE DAUGHTERS WILL ATTAIN RECORD OF PERFORMANCE OF OVER 200 EGGS IN THEIR PULLET YEAR. THIS FAMILY HAS HAD NO MORTALITY DURING THE LAYING YEAR.

individuals. In this study, only families of birds having five or more daughters under trap nest test are considered. These studies were started in the spring of 1939 so that the families under test have not as yet completed the first year's laying. The family value is being recorded on the basis of viability, egg size, earliness of sexual maturity, persistency and intensity of lay and, where members of the respective families are in breeding pens, on hatchability of eggs.

The peanut meal work is part of a major protein feed project, or study, which has been going on for a good many years with a view to determining the best protein for use and how the cheaper and native proteins may be substituted or used. The data has indicated that high grade peanut meal contains the necessary nutrients which permit replacing at least fifty per cent of the more expensive animal protein concentrates in general use without deteriorating the value of the laying mash. In other words, it is possible for the poultryman of North Carolina to use high grade native peanut protein in lieu of other feed materials which are more expensive and have their source outside the State. Similar work is being conducted for the purpose of studying the use of peanut meal as a source or part source of protein in starting and growing mashes. Three pens of chickens numbering over one hundred per pen are now on test mashes, but data will not be available until the end of the 1940 season.

SWINE

D. P. SOUTHERLAND

The Station has continued its two sow and boar hog project, it being the policy not to increase the hog work at this Station beyond this point on account of the presence of large dairy and poultry projects. The purpose of the project is to utilize surplus food crops of the Station which would otherwise be wasted for want of market, and second, to provide good pedigreed breeding stock for introduction into the territory served by the Station. The steady introduction of such stock into the section over a long period of years has been one of the major factors in improving the swine situation in Southeastern North Carolina. When this work was started, razor backs were the common grade of hogs on farms of the section. At the present time it is almost impossible to find a genuine razor back in this part of the State. The first self-feeder for hogs was also built here at the Station. At the present time these feeders can be observed on practically every farm with hogs throughout the section.

AGRONOMY

Coöperating with the N. C. Agricultural Experiment Station,
E. R. COLLINS, *Agronomist*

The three year rotation of corn, oats and vetch, and soybeans was conducted for a twenty year period on the agronomy plots, these plots getting different fertilizer treatments, the same plot having the same treatment throughout the period. Plots without fertilizer applications for twenty years and plots with excessive application, as well as normal plots, were included in the area. This experiment was discontinued under the old outline and put in corn with uniform fertilizer in 1938 and yields obtained. Soil tests were made on the individual plots by two commonly used methods and fertilizer applications made on the basis of the soil tests for corn in 1939. The yields in 1939 varied from six to twenty-nine bushels per acre, although applications were made on the soil test basis. The plats are being continued, but the results from this one year indicate that soil tests will not show up the effect of past fertilizer treatments on the yielding power of the soil.

FORAGE CROPS

Coöperating with the N. C. Agricultural Experiment Station,
R. L. LOVVORN, *Associate Agronomist*

In the forage crop work several projects have been underway during the biennium. These included soybean studies, crotalaria studies, studies of acid tolerant legumes, and studies of various grasses, clovers and other pasture crops alone and in combination.

The purpose of the acid tolerance legume studies was to conduct a nursery planting of these crops in order to make observations as to the adaptability and relative value of these acid tolerant legumes for culture and forage in the coastal plain. The nursery also included the alfalfa nursery that is operated in coöperation with the Alfalfa Improvement Conference. Although considerable variation has been observed between strains of alfalfa, none of them have shown particular adaptability to the local conditions representing Eastern North Carolina. The crotalarias, Subterranean clover and a few strains of perennial lespedezas have shown most promise of the new acid tolerant legumes tested. With the end of this fiscal year, this nursery has been discontinued at the request of the project leaders through the State Experiment Station.

The purpose of the crotalaria tests have been to determine the value of crotalaria as a soil improvement crop. Corn yields have been almost double in a two year rotation of corn and crotalaria. In a three year rotation where corn is grown two years in suc-

cession, followed by one year of crotalaria, the second crop of corn has decreased quite materially. Harvesting crotalaria seed has had little influence on its value as a soil improvement crop. The rattle box moth infestation was so severe in 1939 that the seed crop was very small.

The soybean studies are for the purpose of developing superior strains and to compare recent introductions and commercial varieties for adaptability, seed, hay and grazing purposes in Eastern North Carolina. The large seeded Tokyo, Biloxi, and Palmetto were the best seed producers. Seed yields ranging from 2.7 bushels in the case of Yelredo to 19.5 of Tokyo were secured. The Palmetto hay yield of 5,174 lbs. per acre was the greatest of the medium to fine stem varieties; i.e., the hay varieties. This was much greater than the yield of such recognized hay varieties as Otootan and Laredo. All the Biloxi and Mammoth Yellow crosses continue to segregate for shattering. Several additional selections were made during 1939 for non-shattering characters. Yield records of all varieties, both hay yield and seed yield, have been secured each year.

A new project has been started up which relates to factors affecting the establishment and maintenance of permanent pastures in the lower coastal plain area. The object of this project is to study the effect of various fertilizers on the seasonal yield, total yield and chemical composition of pasture herbage; to study the relative values and adaptations of certain pasture species; to study the competition between species; to study methods of maintaining legumes in an established sod. This test consists of approximately 150 small areas in the Station's permanent pasture, each area being seeded to some pasture crop or some combination of pasture crops. It is hoped that results from this area will throw much light on the pasture problems of the coastal plain region.

HORTICULTURE

Coöperating with the U. S. Department of Agriculture, GEO. M. DARROW, G. A. MECKSTROTH, *and* CHAS. DEARING, *and the N. C. Agricultural Experiment Station*, C. F. WILLIAMS, E. B. MORROW, *and* ROBERT SCHMIDT

Muscadine Grapes. Interest during the biennium in Muscadine grapes has been on the increase and many vineyards have been planted throughout the State. There have also been many small plantings on farms with a view to supplying the home needs and furnishing a certain amount of fruit which could be sold at receiving stations of wine companies. This activity has brought about renewed interest in the Muscadine grape investigations of the Station, which have been underway since the Station was established, and this Station has served as the principal source of

information for those taking up this line of horticultural production. Many prospective growers have been shown over the Station's vineyards for the purpose of acquainting them with our improved methods of culture which have been developed as a result of our research activities.

During the biennium a number of new selections have been made from seedling plantings and these are now under test. A new varietal vineyard for fruit during the next biennium has been planted and a vineyard for the purpose of testing the Station selections from breeding work has also been planted. Many of these selections will be in fruit this year. Blocks 1, 6, and 8 of the vineyard have been discarded as no longer needed, and block 5 has been abandoned by the Government and reconstructed by the State as an overhead vineyard for demonstration purposes.

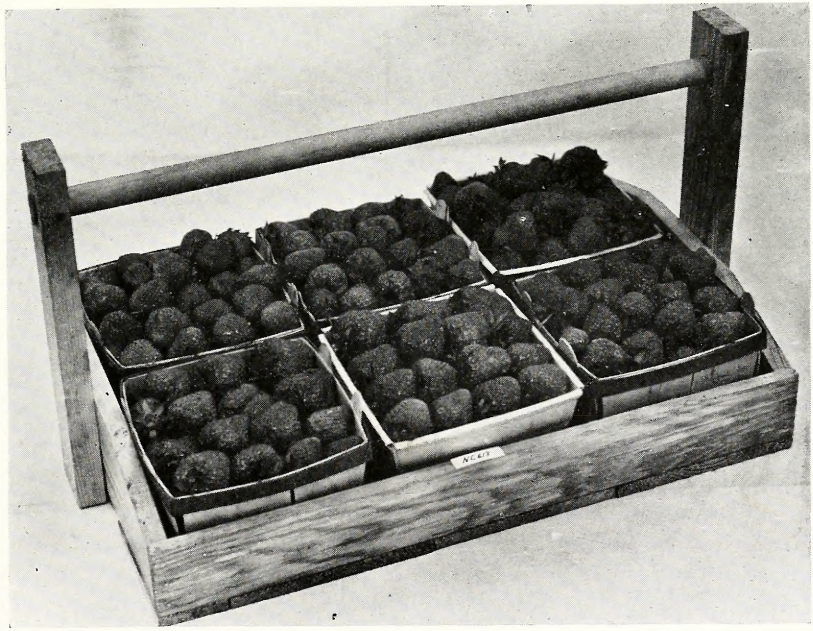
Blueberries. The Station's planting of blueberries of the Rabbit Eye type, which is native to the sandhills of North Florida, has attracted much interest during the biennium owing to the fact that the plants have been observed to be more healthy than those in cultivated plantings of the so-called high bush blueberries, native to this section, which are being grown in cultivated fields. The culture of blueberries in this section traces back to the establishment of a blueberry project by this Station after the development of coöperation on this project with Dr. F. V. Coville, Blueberry Specialist of the U. S. Department of Agriculture. The original activities of establishing test fields created interest among New Jersey blueberry growers, which resulted in several of these growers coming to North Carolina and establishing plantings here. The great success these growers have had has resulted in still others coming. At the present time there are as many as thirty large commercial plantings of cultivated blueberries in the section, and some of these are owned by native North Carolinians. Others are owned by growers from other sections who have come here and established their homes as well as their business. To indicate the extent to which this industry has developed, it may be stated that one grower shipped as many as eighteen hundred crates of blueberries in one day in the season of 1940, these berries selling at an average price of 40¢ per quart. It may be said that the blueberry industry in North Carolina is now thoroughly established as a major fruit industry of the section.

Bulbs. Bulb work at the Station has now been discontinued except for certain Station stocks which are being grown until such time as they can be disposed of commercially. The bulb industry is now also thoroughly established.

Brambles. During the past biennium, the plant breeding work with brambles has been enlarged. Thousands of seedlings

have been tested out and selections have been made. This work relates to blackberries, dewberries and raspberries, and it is hoped that in the new varieties of these fruits better adapted to the climatic conditions of Southeastern North Carolina will be available. The Station has continued its plantings of the Youngberry and the Boysenberry and has used same as a source from which plants of these excellent fruits for home use have been distributed to many farmers throughout the section.

Strawberries. The strawberry work has been one of the outstanding projects of the Station during the past biennium. Thousands of seedlings have been produced and tested and some very promising new selections are now being propagated and tested. Of selections mentioned in the last report, three were introduced, and another, the 613, has also been released, but not yet officially named. It was on the market at Wallace, North Carolina, during the past season and brought highest prices on that market. It appears likely that this variety will be grown along with the Blakemore as a companion variety fruiting later than Blakemore.



A TRAY OF SELECTION No. N. C. 613 STRAWBERRIES, A NEW VARIETY PRODUCED AT THE COASTAL PLAIN STATION, WHICH IS BEING PLANTED HEAVILY IN SOUTHEASTERN NORTH CAROLINA AS A COMPANION VARIETY TO GO ALONG WITH THE BLAKEMORE, WHICH IS THE LEADING COMMERCIAL VARIETY. THIS VARIETY IS LATER THAN BLAKEMORE. THE BERRIES ARE LARGE, FIRM, ATTRACTIVE AND OF EXCELLENT FLAVOR, AND THE PLANT IS VIGOROUS AND PRODUCTIVE.

It should be reported here that the Blakemore, which was introduced from this Station, has gradually increased in importance until it is now the leading variety grown throughout the United States on an acreage basis. Here in the section where it originated it was the outstanding variety of the past season, bringing uniformly high prices throughout the season as compared to other varieties. It has been said by informed people that the extra money which this variety has brought to the farmers of Southeastern North Carolina has far more than equaled all the cost of this Station to the State since it was established.

During the biennium, the Station has conducted some tests in the forcing of strawberries under inexpensive cold frames. The winter of 1938-39 was a warm winter. The first ripe berry was secured on February 7 and a fine crop of fruit in advance of the regular season was secured. The winter of 1939-40, however, was a uniformly cold winter throughout and the results were not so favorable. Owing to the cold weather, the plants failed to bloom in mid-winter and when they did bloom the weather remained sufficiently cold to hold down insect pollination. Fruit was secured in advance of the regular season, but not in sufficient quantity to be of commercial importance. It is believed that the two extremes were encountered in these two years and future tests will be made with a view to determining what can be accomplished in the average year.

The Station has continued to serve as a source for distributing new selections resulting from our breeding work, and plants of the new varieties, in addition to the Blakemore, have been sent out to farmers of the section, thus insuring them foundation stock of the best quality.

Record should be made of the results obtained by the Station in coöperation with the cash auction market at Wallace toward the establishment of better grading and packing of strawberries. The Station began some ten years ago on this project and first developed its own methods of grading and packing with a view to having a standard pack throughout the season and one which could be counted on by buyers, then placing this pack on the market where it would compete with the berries being delivered to market by private growers, in the interest of demonstrating the fact that U. S. No. 1 berries could be packed and delivered to market, that if they were systematically put on the market they would bring better prices, and finally, to point out just how this could be done. At the same time we have, by this procedure, shown the growers and the market the merits of varieties produced at this Station. As a result of this work, field workers on the Station who became familiar with our methods began carrying similar fruit to the market and getting higher prices. Their

experience encouraged others and gradually the movement spread. The market management also advertised that they would pay more for U. S. No. 1 fruit and encouraged growers to pack fruit like that being delivered by this Station. During the last year, it may be said that the vast majority of the fruit going through the Wallace market was of good pack and quality. In fact, there was more U. S. No. 1 fruit sold in one day on the market this year than would have been sold during the entire season four years ago. This grading up of the fruit being delivered to the market results in the market being able to pay higher prices to the growers. The results of the Station's work were so pronounced in this respect that the Extension Service saw fit this season to establish a special force of workers to go into the strawberry sections and systematically work with the growers for a pack like that produced at this Station. Many of the growers have not only adopted the pack of the Station, but have adopted the special crate which the Station has been using, and the market management itself has purchased crates of this type during the past season in carload lots and distributed them to the farmers as a better crate for fancy fruit. In this work of developing a better pack of strawberries on the Wallace and other markets of the section, the Station has had excellent coöperation from the Division of Markets and the Inspection Service, and the encouragement and advice which the inspectors have given to the farmers day by day over recent years has been an important factor in bringing about the results of uniform good packing of quality fruit in contrast to the inferior grading and packing which existed a few years ago.

The farmers have taken up in full measure the results of the Station's work on diseases relating to strawberries, and it is now a recognized practice to spray strawberries with Bordeaux mixture at least once in the spring as a control measure against the leaf spot disease. This spraying for leaf spot has also been an important factor in the production of better quality fruit for the market.

Sweet Potatoes. Under this project continued selections for type and yield of the N. C. strain No. 1 Porto Rico potato has been continued in order to maintain the Station strain as a source of registered seed stock. During the biennium, all the seed potatoes which the Station could procure from its fields have been distributed to farmers in the State.

Watermelons. A test of watermelon varieties was started in the spring of 1940 and will be reported on in the next report.

TRUCK CROP DISEASE STUDIES

Coöperating with the N. C. Agricultural Experiment Station,
LUTHER SHAW

In the spring of 1940, a new project was begun at the Station having to do with the studies pertaining to the diseases of truck crops. Special attention has been given during this first season to diseases affecting the bean, cucumber, and melon crops. It is believed that this project is of very great importance to the Southeastern part of the State owing to the vast amount of truck crops which are grown here, and in view of the fact that still more of these crops will probably be grown in the future owing to the failure of cotton to succeed in this section, in the presence of the boll weevil; and the necessity of reducing tobacco acreage under present demands.

MOUNTAIN STATION—SWANNANOA, N. C.

DEAN W. COLVARD, *Assistant Director in Charge.*

Station Established in 1908.

Area of Station, 316 Acres. Soil Types: Toxaway and Ashe Clay Loam.
Elevation, 2,250 feet above sea level.

Climatological Data for 1939

Mean Annual Temperature, 55.6 degrees Fahrenheit.
Annual Rainfall, 38.75 inches. Total Snowfall, 6.0 inches.

PUBLIC SERVICE

Farmers Field Days, at which from two to three thousand farm people have been present, have been held each year during the biennium. Also, specialized educational days have been held for the study of poultry, horticulture, etc. Many farm people call at the Station for whatever information may be available relative to their respective farming problems.

IMPROVEMENTS AND ADDITIONS

Four new 22-ton metal silos have been erected for studying preservation and use of legume and grass silages. The Tennessee Valley Authority has coöperated in furnishing this equipment. The T.V.A. paid $1,096 for these silos and the Mountain Experiment Station erected them at a cost of approximately $300.

A new poultry brooder house with twelve brooding sections and a laying house containing six pedigree pens has been constructed and completely equipped with modern appliances at a cost of $3,375.

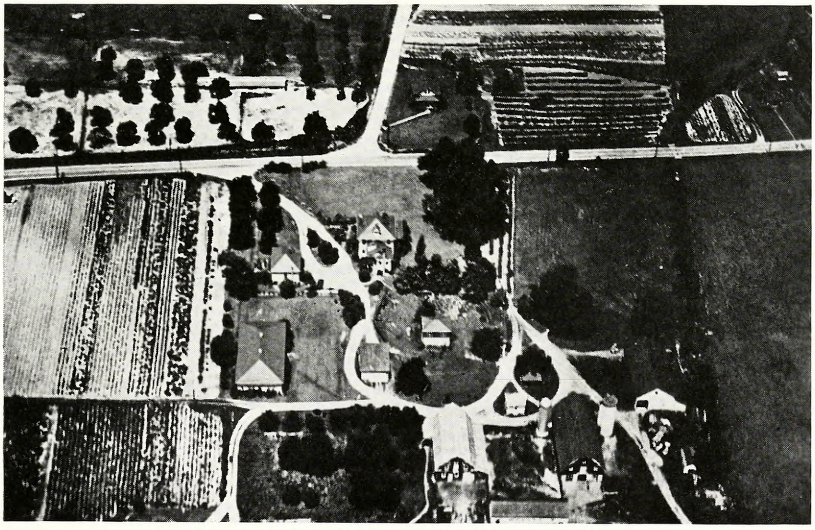
A purebred Percheron stallion, Blackland's Donnot, was transferred from the Blackland Station to the Mountain Station. He has been in considerable demand for public breeding.

A barn for curing burley tobacco to take care of research work recently started is in the process of construction.

THE 4-H CLUB CAMP

The 4-H Club Camp, located on this Station, has undergone much improvement during this biennium. All of the old cabins have been torn down and nine new ones have been built. This modernization was made possible by building materials contributed by various 4-H county units and by the work program of the National Youth Administration.

Each week during the summer a group of from 50 to 125 boys and girls, under the leadership of their county and home agents, attend camp. A tour of the experimental work conducted on this Station is made by each group.



VIEW OF MOUNTAIN EXPERIMENT STATION FROM THE AIR.

POULTRY

Coöperating with the N. C. Agricultural Experiment Station

Crossbreeding Broiler Project (R. S. Dearstyne, C. S. Bostian, J. E. Love): This experiment was made possible by the construction of two new buildings equipped with modern appliances. The project was started to:

(1) Measure the effect of crossbreeding for broiler production on: a. Hatchibility of fertile eggs; b. Livibility of chicks; c. Growth rate of chicks; and d. Feed consumption of chicks.

(2) To determine the finishing quality and market demand for such crosses as are developed.

(3) To compare the performance of the female F_1 generation with the performance of their dams.

In the fall of 1939, tested fowls of the following breeds were purchased as foundation breeding stock for this experiment: Single Combed White Leghorns, Barred Plymouth Rocks, New Hampshires, Rhode Island Reds, White Rocks, and Cornish. The first crop of broilers is growing as this report is made, and data will be forthcoming.

To Measure the Effects on Production and the Cost of Lighting Laying Pullets (R. S. Dearstyne and J. E. Love): The years 1938-39 and 1939-40 were the third and fourth years of this experiment, which was set up to observe the relative production of pullets under normal daylight conditions and pullets given an increasing number of hours of artificial light. The artificial light has been increased from twelve hours the first year to fourteen hours the second, sixteen the third and to eighteen hours during the winter of 1939-40. This increase in length of the working day has been accompanied by considerable increase in production and the cost is more than offset by the increased number of eggs. The data secured for the first three years is as follows:

Year	Length of Day	Months of Test	Eggs per Bird		Kilowatt Hours
			Control	Test	
1936-37	12 hrs.	6	62	63	69
1937-38	14 hrs.	7	93	95	71
1938-39	16 hrs.	8	105	115	167

AGRONOMY

Coöperating with the N. C. Agricultural Experiment Station,
C. B. WILLIAMS

T.V.A. Calcium Metaphosphate Trials (W. W. Woodhouse, Jr.): A comparison of Calcium Metaphosphate as a source of phosphate with triple superphosphate and 16% superphosphate in two different rotations is being conducted. Field 1 consists of Hayesville sandy loam and is planted in the rotation of wheat and soybeans. Field 11 consists of Toxaway loam and is planted continuously in corn followed by crimson clover in the fall. This project was started in the spring of 1937, and the first repeat crops in the three-year rotation are growing. Some differences are developing and some results will be available after this year's crops are harvested.

Small Grain Variety and Breeding Tests (G. K. Middleton and W. H. Chapman in Coöperation with the U. S. Department of

Agriculture): A. *Wheat.* A uniform soft red winter wheat nursery consisting of 30 of the most promising varieties each year is planted and yields are taken and winter hardiness observations are made. The mountain area is desirable for testing winter hardiness due to the fact that its winters are colder than in other parts of the State. In addition to the varieties in winter hardiness, a uniform winter wheat rust nursery is planted to determine the rust resistance of the different varieties in the mountainous area. Bearded Fulcaster 151 is the highest yielding variety for the mountain area and a registered and certified seed source is maintained by the Station. B. *Oats.* Spring oat variety tests including 12 standard varieties and several new smut and rust resistant strains have been conducted to find non-fatuoid producing oats and to study the inheritance of that character. The uniform winter hardiness nursery, consisting of 30 varieties, is planted at this Station, in coöperation with the U. S. D. A. Similar winter hardiness tests are conducted at other stations in Eastern United States. No variety has been found yet which can be recommended for planting to withstand the severe winter, although in some seasons fine crops of fall sown oats have been produced. The 90-day Burt is one of the highest yielding varieties of spring oats for this area. C. *Barley.* A winter hardiness and variety nursery and also hybrids for selection studies have been planted during this biennium. Fifty bulk hybrids and five composite hybrids were planted in the fall of 1939. Fifty varieties have been tested for winter hardiness and yields.

A Study of Different Fertilizer Treatments Combined with the Effect of Turning All Legumes in a Rotation of Corn, Soybeans, Wheat, and Lespedeza to the Soil as Compared to Taking Off All Legumes (Field R—W. H. Rankin): The indications are that returning all legumes to the soil will more than maintain the yields. There are differences with the different treatments of fertilizer on plats where complete fertilizers are used. When all legumes are returned to the soil, the corn and wheat yields have been more than maintained.

Fertilizer Nutrient Ratio Tests in Rotation on Toxaway Loam (Field A—W. H. Rankin): This experiment has been carried on for 30 years. It contains 18 plats receiving different nutrients and combinations of nutrients in varying amounts. Certain definite deficiencies have developed and highest yields of corn, wheat, and soybeans have been secured from plats receiving complete fertilizer.

Hybrid Corn Tests (Paul H. Harvey): More than 200 selections of hybrid corn have been planted in tests during the bien-

nium. Some hybrids are making good yields and one or two will be released for trials in general farm planting in the mountainous area within the next two years. It has been found that most of the hybrids recommended and sold for the mountainous area have not given yields consistently as high as the standard varieties. As soon as some of the best selections have proven themselves, they will be released for general planting.

Continuous Corn and Crimson Clover: Two fields have been planted in a rotation of crimson clover and corn continuously for more than 20 years. This project has been discontinued as an experiment, but the general plan of planting has been followed. It appears in the spring of 1940 that Field A has developed a noticeable deficiency and an effort will be made within the next year to learn just what this deficiency is which results from continuous cropping in corn and turning under crimson clover.

FORESTRY

R. W. GRAEBER

The four varieties of pines planted in 1934 are still being observed for habits and rate of growth. These trees were planted under the supervision of the Forestry Extension Service and permanent records of this timber growth are being made.

TOBACCO

E. G. MOSS

In answer to requests from several western counties in which there are approximately ten thousand tobacco growers, burley tobacco research was begun in the summer of 1940. Ten different varieties and ten different fertilizer treatments are being tested on both the upland and lowland soils. A new curing barn is under construction and it is expected that grading schools will be conducted by the marketing specialists of the North Carolina Department of Agriculture during the fall.

HORTICULTURE

Coöperating with the N. C. Agricultural Experiment Station,
M. E. GARDNER and E. B. MORROW

Fruit Variety Studies: A. *Apples.* No new varieties have been added during this biennium. There are 40 varieties now in production and additional data is being taken on several summer hybrids which were planted for tests and observations. B. *Grapes.* Seventy-two varieties of grapes are still in production, and Concord, Niagara, Lutie and Delaware are still the leading varieties for the mountain area. C. *Raspberries.* A

plat consisting of twelve different varieties of raspberries was planted in 1939 for variety and fertilizer studies. Latham, which is the leading variety for this area, is being used for the fertilizer tests and Black Beauty is an outstanding black variety. D. *Cherries.* Montmorency and Early Richmond are adapted sour varieties for the mountains and Schmidt and Napoleon are adapted sweet varieties. E. *Dewberries.* Lucretia has proven satisfactory for the mountains. F. *Strawberries.* A plat consisting of twelve varieties of strawberries, including three of the outstanding everbearing varieties and three new varieties, was set in the spring of 1940. The Premier, Dorsett, and Catskill are leaders in the mountain area.

Some of these fruits, which have been growing for several years, have been left for demonstration and are not conducted as experiments. A vegetable garden consisting of standard varieties of vegetables adapted to the mountain area has also been maintained on a demonstration basis. There are also many different types of shrubs, chestnut trees, and pecan trees, and bulbous and other flowers grown for beautification and demonstration purposes.

DAIRY

Coöperating with the N. C. Agricultural Experiment Station,
C. D. GRINNELLS and J. R. B. WILLIAMSON

Dairy Pasture Studies 111: The following outline shows the rate of application and the ratio of nutrients for fertilizer tests applied to five 3-acre plats, and table No. 2 shows the yearly total digestible nutrient yield of each plat and the average yield for 1930 to 1939.

FELICITY OF OXFORD LAD, JUNIOR HERD SIZE, MOUNTAIN EXPERIMENT STATION.

FERTILIZER APPLICATIONS, MATERIALS, RATE AND TIME OF APPLYING—1930-1938*

Plat No.	Material	Analysis	Rate of Application		Pounds Plant Food per Acre			Time of Application
			Per Acre lbs.	Per Plat lbs.	N	P_2O_5	K_2O	
I	Superphosphate	16%	300	900	--	48	--	
	Nitrate of Soda	15%	160	480	24	--	--	
	Muriate of Potash	48%	50	150	--	--	24	March 1
II	Superphosphate	16%	300	900	--	48	--	
	Nitrate of Soda	15%	160	480	24	--	--	March 1
	Muriate of Potash	48%	50	150	--	--	24	
	Nitrate of Soda	15%	100	300	15	--	--	July 1
III	No fertilizer (check)	----	----	----	--	--	--	
IV	Superphosphate	16%	300	900	--	48	--	
	Muriate of Potash	48%	50	150	--	--	24	March 1
V	Superphosphate	16%	300	900	--	48	--	
	Nitrate of Soda	15%	160	480	24	--	--	March 1
	Muriate of Potash	48%	50	150	--	--	24	
	Nitrate of Soda	15%	100	300	15	--	--	June 1
	Nitrate of Soda	15%	100	300	15	--	--	August 1

*Revised March 15, 1938, R. L. Lovvorn, using 16% Nitrate of Soda and 42% TVA Superphosphate.

YEARLY TDN YIELD PER ACRE:

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Plat I	1706.8	1624.6	2112.5	2182.3	2380.0	2378.0	2170.0	2629.3	2577.0	1683.6
Plat II	1822.2	1691.8	1976.6	2300.0	2255.6	2436.0	2221.0	2654.0	2652.0	1693.0
Plat III	1262.9	1139.0	1307.1	1001.3	1548.0	1800.0	1453.0	1844.0	1848.6	1504.0
Plat IV	1036.3	1072.8	1205.9	1010.6	1479.0	1562.0	1343.0	1617.6	1530.0	1229.3
Plat V	1655.6	1462.5	1840.3	2051.6	1998.0	2203.0	2096.0	2159.3	2081.6	1999.6

Average:

Plat I	2144.41
Plat II	2161.22
Plat III	1470.79
Plat IV	1308.65
Plat V	1954.75

Legume Silage Studies: The small metal silos were erected for the purpose of studying the place of the TVA liquid phosphoric acid in the silage program of the TVA watershed. This project is expected to yield information concerning the best method of preserving the total digestible nutrients for the dairy cow. After they have been produced in the form of cereals or legumes, great losses in curing frequently result from rainy weather, but by the use of the silage method, alfalfa, clover, soy-

beans, and cereals may be cut and put in the silo even during a rainy season. Some comparison of quality of feed and milk production by the use of phosphoric acid and blackstrap molasses are also being made.

PIEDMONT STATION—STATESVILLE, N. C.

J. W. HENDRICKS, Assistant Director in Charge.

Station Established in 1903.

Area of Station, 233 Acres (State) Soil Type: Cecil Clay Loam.
133 Acres (Federal)
Elevation, 950 feet above sea level.

Climatological Data for 1939

Mean Annual Temperature, 61.3 degrees Fahrenheit.
Annual Rainfall, 41.43 inches. Total Snowfall, 5.5 inches.

GENERAL

During the past two years this Station has practically doubled its acreage in growing for increased purposes recommended strains of our leading small grains. The work has been primarily with barley, wheat, and oats. Our annual production covering this biennium has been more than 4,000 bushels, and our annual sales for seed purposes have amounted to more than 3,000 bushels. This Station has not been able to meet the demands for wheat, barley, and oats, and we are handicapped in that we do not have sufficient acreage.

The small grain is being distributed not only in Piedmont North Carolina, but in the mountain and coastal plain sections as well. From this and adjoining states the reports on both yield and quality are gratifying. The Station only grows for increased seed production such varieties as recommended by Dr. G. K. Middleton, seed breeder for the North Carolina Agricultural Experiment Station.

During 1938-39 our Annual Farmers' Field Days have been outstanding with attendances of 4,000 people. We have also held during this period Small Grain Field Days and Livestock Days, with an average attendance of 300 at these meetings.

The Station continues to be a central source of information for this section, and the increasing number of visitors throughout each year will give some idea as to how the Station's activities are appreciated. Our monthly visits during the summer will average more than 500, these coming as individuals and in groups.

LIVESTOCK

Coöperating with the N. C. Agricultural Experiment Station,
EARL H. HOSTETLER and JOHN E. FOSTER

A Study of Pastures and Their Utilization by Sheep (R. E. Stitt, Forage Crops, U. S. D. A.): The 1939 season culminated

five years of grazing with sheep on annual pastures of Abruzzi rye and Korean lespedeza, domestic ryegrass and Korean lespedeza in comparison with a permanent pasture seeded down in 1934. The rye-lespedeza combination produced the highest yield. Permanent pasture yielded slightly more than the ryegrass-lespedeza combination. Lespedeza yields were higher over a two-year period when grazed through September and October than when the grazing season of the lespedeza ended in late August for September seeding of rye or ryegrass.

SHEEP GRAZING EXPERIMENT AT THE PIEDMONT EXPERIMENT STATION.

Breeding Stock: The Station furnishes ewes and purebred Hampshire rams as breeding stock when available, at reasonable prices.

The Family Sow: This project is to determine the cost of maintaining three purebred sows and one purebred boar and their offsprings under general farm conditions. Breeding stock is sold to farmers of the section.

AGRONOMY

Coöperating with the N. C. Agricultural Experiment Station,
C. B. WILLIAMS

Fertilizer and Lime Requirements for Cotton, Corn, Wheat, and Red Clover When Grown in Rotation on This Type of Soil

(W. H. Rankin): The main objectives of this experiment are as follows:

(1) To determine the nitrogen, phosphoric acid and potash deficiencies of this soil type.

(2) The proper proportions of nitrogen, phosphoric acid and potash that should be used for leading field crops.

(3) To determine best quality of fertilizer to use per acre.

(4) To study the symptoms of any nutrient deficiencies that may develop.

It has been found that when applied singly, phosphoric acid is the most important nutrient to be supplied for production of corn, cotton, wheat, and red clover, with nitrogen ranking second in importance, and potash the least important as far as yield is concerned. However, for the control of potash deficiency ("rust") of cotton and frenching corn, potash is of primary importance to be added.

From observation on the cotton crop and corn crop on Field A, it is evident that potash deficiency of cotton is most severe in its damage where higher percentages of superphosphate are applied in the fertilizer mixture, or where it is used in large amounts. Results secured show that an application of one ton of limestone once in the rotation accentuates the potash deficiency of cotton symptoms, lowers the quality of the fibre and the seed of the cotton.

For the production of red clover on this soil is not only essential to be added, but liberal quantities of available phosphoric acid and potash.

Studies of the Efficiency of Superphosphate and Rock Phosphate as Source of Phosphoric Acid on Cecil Clay Loam Soil (W. H. Rankin): When equal amounts of phosphoric acid are applied from superphosphate and rock phosphate, the superphosphate produces larger yields than rock phosphate. With the increasing quantities of rock phosphate applied, the severity of potash deficiency symptoms and damage has been found to increase. This observation is evident on both the limed and unlimed series of plats, it being as in other cases, always more pronounced on the limed series.

A *Study of the Yield and Quality of Crops when Wheat and Corn are Each Grown Continuously on the Land* (W. H. Rankin): The most outstanding difference is between continuous corn without lime and a three-year rotation of corn, wheat, and red clover with lime applied once in a rotation. The average yield of corn per acre where corn has been grown continuously with a complete fertilizer is 19.3 bushels, while the average yield

of corn per acre in a three-year rotation of corn, wheat, and red clover is 37.3 bushels.

Cotton Improvements (P. H. Kime): The Mexican Big Boll variety is the principal variety grown at this Station. Pure line selection work is carried on yearly and high yielding strains of uniform staple have been developed, which are well adapted to the conditions under which they are grown. Last spring this Station distributed to growers 200 bushels of registered Mexican Big Boll Cotton Seed, Strain 128-6.

Cotton Varieties (P. H. Kime): This project is to make a study of cotton varieties and strains with reference to new types that may be introduced from time to time.

Corn Breeding (G. K. Middleton): To produce and maintain a high standard of Weekley's Improved, which has been leading in our variety work for a period of fifteen years. The Station has been distributing approximately 100 bushels of registered seed corn per year.

Corn Varieties (G. K. Middleton): To determine the best varieties adapted to this locality, the following table shows the results of our work for the past twelve years:

Variety	*Acre Yield*
Weekley's	40.1
Jarvis' Golden	38.8
Latham's	37.5
Southern Beauty	37.0

Small Grain Breeding (G. K. Middleton): The production of varieties of small grain crops including wheat, oats, rye, and barley which are superior in yield, adaptability, and disease resistance is the object of this small grain work.

Registered and Certified Seed: The Station produces annually approximately 1,200 bushels of registered and certified seeds. The demand for quality seed is increasing from year to year.

Wheat Variety Tests (G. K. Middleton): Over a period of fifteen years, we find the following varieties leading:

Variety	*Acre Yield*
Fulcaster	30.3
Leaps	30.0
Gleason	29.8
Purple Straw	29.6

Oat Varieties (G. K. Middleton): The Lee variety has proved to be the best winter oat for fall seeding in the Piedmont area of the State. It is more resistant to winter injury than any known variety. Over a period of fifteen years, it has been our highest yielder.

Barley Selections and Varieties (G. K. Middleton): To develop more reliable types of barley with reference to yield, disease resistance, and other favorable characteristics adapted to Piedmont North Carolina. We find the bearded varieties give us our best yields, while the objectionable feature is the harvesting and threshing. The two outstanding varieties grown in this State are North Carolina Bearded, which is badly mixed, and Tennessee No. 6, a smooth barley which is comparatively pure. These varieties are both susceptible to smut diseases. The Station has developed

BARLEY, STRAIN 1-68, PIEDMONT EXPERIMENT STATION.

two distinct types of bearded barley and has made one selection from Tennessee 6. These three selections are showing quite an increase in yield over other barleys being grown in this section and are practically resistant to smut. We are increasing this selection as fast as possible and this year have grown approximately 700 bushels for distribution.

Head Selection (Barley) (G. K. Middleton): To develop more desirable types of barley, and to compare under uniform conditions those best adapted to Piedmont North Carolina as to yield and other desirable characteristics.

Rye Varieties: To determine the outstanding varieties adapted to this and other sections of North Carolina. Abruzzi gives us our best yield with but very little difference in Abruzzi and Balbo with reference to pastures, perhaps a slight advantage in favor of the latter, but in strength of straw, the Balbo is very deficient and is susceptible to lodging. The Station produces ap-

proximately 200 bushels of registered Abruzzi seed for sale each year.

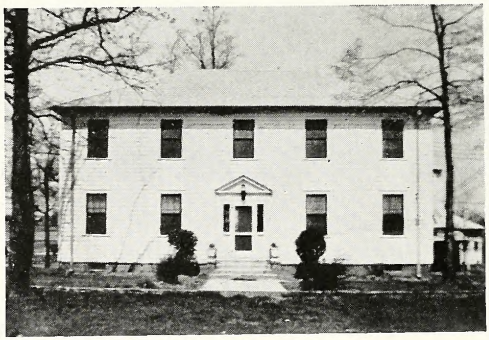
Rust Resistance Studies with Small Grains (G. K. Middleton): To obtain strains of varieties of small grains which are suitable to North Carolina. Also to determine varieties which are more resistant to leaf and stem rust than the varieties which are now commonly grown.

Pasture Fertilizer Tests: To determine the best fertilizer for pastures in Piedmont North Carolina and the time of applying same. Our study reveals that nitrogen is our limiting factor; however, in making a good pasture one should not overlook the value of lime and phosphate.

FORAGE CROPS

Coöperating with the Office of Forage Crops, U. S. D. A., and the N. C. Agricultural Experiment Station, R. E. STITT, *U. S. D. A.*

Date of Cutting in Relation to Leaf Hopper Injury to Alfalfa: Leaf hopper injury of alfalfa was reduced when the first cutting was delayed until June 1 as compared with May 15.



OFFICE BUILDING, PIEDMONT EXPERIMENT STATION.

Fertilizer and Seeding Studies with Crimson Clover: The application of phosphate to crimson clover gave increased yields and stands in relation to the rate of the application which varied from 0 to 250 lbs. of P_2O_5 per acre. August seedings gave higher yields than September. Seed with the hull yielded higher than that with the hull removed.

Lespedeza Sericea in Comparison to Alfalfa: Lespedeza sericea on limed and fertilized soil has maintained stands over a period of six years in comparison with alfalfa which had such poor stands at the end of four years that yields could not be obtained. The sericea outyielded the alfalfa every year.

Fertilizer Tests with Kentucky Bluegrass: Nitrogen and lime produced the most growth of Kentucky bluegrass. Lespedeza grown with the bluegrass has maintained stands for three years on plots receiving no treatment, lime, phosphate, and potash in the different combinations. Annual top dressings of 200 pounds of sulphate of ammonia per acre produced heavy spring growth of bluegrass, but lespedeza was not able to survive under the heavy growth.

Grass Mixtures: Kentucky bluegrass and lespedeza were the high producers in numerous mixtures studied in different combinations and rates.

COTTON BREEDING STATION

Coöperating with the U. S. Department of Agriculture

Under a Public Works allotment of $56,000 to provide land, buildings, and other facilities for investigational work on cotton, a Federal Station was established in 1936, adjoining the Piedmont Experiment Station at Statesville, N. C. Work at this Station is coöperative with the State Department of Agriculture, the State Experiment Station and other State Agricultural Agencies, with the object of improving the status of cotton production through (1) developing better cultural practices, (2) producing varieties superior in yield and quality and more resistant to diseases and other factors adversely influencing production, (3) studying the diseases of cotton and determining methods for their control, (4) determining the underlying principles concerned in the production of quality cotton and its improvement, and (5) developing and applying methods for utilizing and maintaining quality seed stocks, particularly through single-variety communities. These investigations are a part of a National program of improvements in production and quality American cotton.

Fundamental to such a program is a more thorough study of existing varieties from broad cotton belt standpoint. It is necessary to make a more complete inventory of the present cottons before the most intelligent sort of production is set up for further improvement. Varieties are now being studied with the view of determining the influence of soil, region, season, and variety on yields, useful factors and quality of fibre as measured by field performance, ease of picking, ginning tests, technical measurements of fibre properties, spinning tests, etc.

FORESTRY

Forestry Variety Work (R. W. Graeber): To determine the best variety of pines in this section. In this experiment we are studying the value of forestry in connection with soil building and

soil erosion prevention. This experiment is only eleven years old, but we are, nevertheless, observing outstanding results and we are thinning for proper stand.

HORTICULTURE

Coöperating with the N. C. Agricultural Experiment Station,
M. E. GARDNER

Peach Fertilization: This is the fifth bearing year for this orchard. From data received, the following observations are made:

1. There was practically no difference in total yield between treatments of unfertilized vetch cover crop plus nitrogen applied to the trees and unfertilized vetch alone. These were the two highest yielding plats.
2. N. P. K. applied to the trees under clean culture conditions ranked third in total yield.
3. Vetch cover top dressed with 200 pounds of a 4-12-2 fertilizer plus P. K. applied to trees gave the highest percentage of desirable fruit grades.

Measurements were made on 100 terminal branches from each plat, and the number of fruit heads determined.

Raspberry Fertilization: These plants have been bearing for three years. Harvesting began June 12 and continued into July. In addition to yield data, leaf counts were made and number, length, and circumference of canes recorded. In connection with leaf counts, comparison was made between sprayed and unsprayed plants.

It is found that by adding one or two more Bordeaux sprays to the schedule, fungus diseases may be largely controlled.

Two red seedlings, U. S. D. A. No. 9 and N. C. R. 30, planted at Statesville in March, 1935, showed greater resistance to foliage diseases than Latham.

Fruit Variety Studies: This test has been continued with peaches, cherries, grapes, apples, and small fruits to determine varieties best suited to Piedmont conditions.

TOBACCO STATION—OXFORD, N. C.

E. G. Moss, Assistant Director in Charge and
Senior Agronomist, U. S. D. A.

Station Established in 1912.

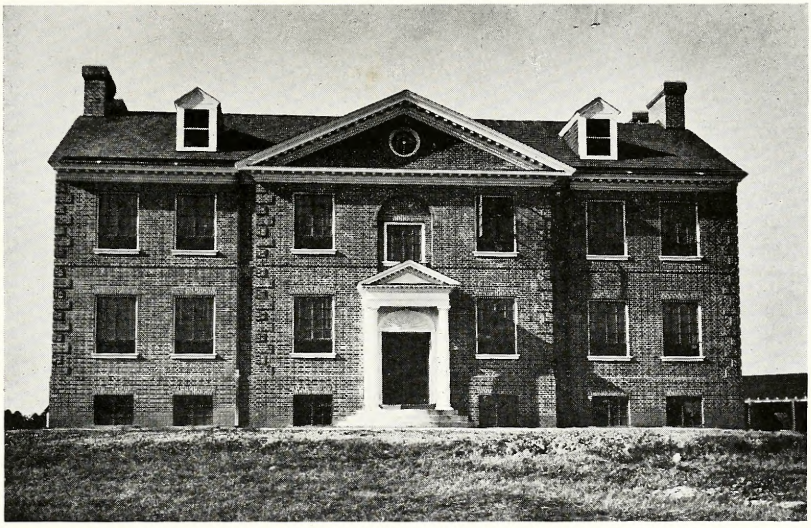
Area of Station, 250 Acres, with 78 Acres under lease. Soil Types: Durham and Sandy Loam.
Elevation, 500 feet above sea level.

Climatological Data for 1939

Mean Annual Temperature, 60.2 degrees Fahrenheit.
Annual Rainfall, 51.78 inches. Total Snowfall, 9 inches.

NEW FEDERAL LABORATORY

The 1938 Congress of the United States appropriated $80,000 for an office and laboratory building, greenhouses, and garage at the Tobacco Station. These buildings have been completed and are used by workers in the Bureau of Plant Industry and Entomology and Plant Quarantine, as well as by the tobacco specialists in the State work. Congressman Wm. B. Umstead of Durham, N. C., was largely responsible for securing this appropriation.



OFFICE AND LABORATORY BUILDING, TOBACCO EXPERIMENT STATION.

GENERAL

The primary object of the work at the Tobacco Station is to improve the tobacco crop by better cultural methods, better methods of applying fertilizers, crop rotations, varieties, disease control and better curing methods.

In addition to the work which is being carried on at the Tobacco Station, intensive studies of tobacco diseases are made with particular reference to Granville wilt, root-knot, black shank, and black root rot. In order to carry on these four projects, three men are employed for this work, namely: Messrs. James F. Bullock, T. E. Smith, and K. J. Shaw. For this work there has been leased a plot of land consisting of 4 acres of land in Forsyth County for the study of black shank, approximately ¾ acre in Guilford County for the study of black root rot, two plats of land in the southern part of Granville County near Creedmoor, one of 4 acres and another of 8 acres, for the study of Granville wilt, and a plat of land of about 20 acres in Wake County near

McCullers Station on the Highway between Raleigh and Fuquay Springs for the study of root-knot.

RESEARCH

All research with tobacco is handled in coöperation with the U. S. Department of Agriculture and the N. C. Agricultural Experiment Station.

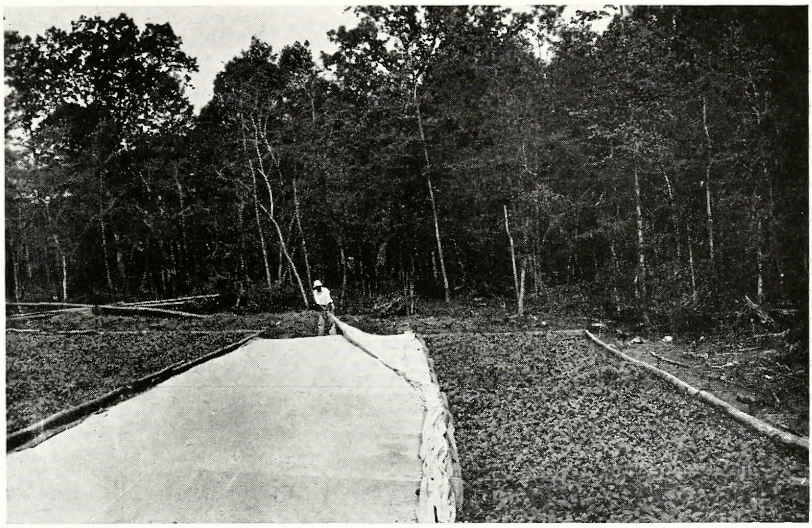
The general leaders in all tobacco experimental work in the State are W. W. Garner, E. G. Moss, James F. Bullock, T. E. Smith, and K. J. Shaw. Dr. R. F. Poole is a joint leader in the tobacco disease projects.

Tobacco Varieties: A large number of so-called varieties have been studied and classified during the past several years. In addition to the study of these varieties, a number of hybrids have been developed, some of which show some resistance to certain diseases. For instance, Special 400 is highly resistant to black root-rot, and indications are that it may be a desirable flue-cured variety. It has not yet been generally recommended even in areas infested with this disease as it is desired to give more consideration to the aging and smoking quality of this type before recommending it.

The varieties generally recommended are White Stem Orinoco, Cash, Jamaica, Gold Dollar, Virginia Bright Leaf, and Bonanza. These may be considered the best standard varieties. During the past two or three years it is estimated that approximately 80 to 90 per cent of the entire plantings in North Carolina are from this group.

Tobacco Seed Beds: Tobacco seed beds are fundamental in the production of a good crop of tobacco. Fertilizer studies for seed beds have been conducted for the past three seasons, using as a base two pounds of a 4-8-3 fertilizer mixture per square yard. Individual sources of nitrogen were used as follows: nitrate soda, sulphate ammonia, tankage, urea, soybean meal, and cotton seed meal compared with a mixture of these sources and at rates of one to two pounds of this 4-8-3 mixture per square yard also with high rates of potash ranging as high as 8 to 12 per cent. In two years out of the three, when individual sources of nitrogen were used, very soluble forms of nitrates did not give as good results in wet years as either the mixed form of nitrogen or that derived from more slowly available sources. Soybean meal has given exceptionally good results. The plats on which mixed nitrogen was used gave better results than some of the plats on which individual sources were used. It appears that on plats where 3 per cent potash was used practically as many good plants were secured as on plats with a heavier rate of application.

Steam sterilization and the use of a permanent bed have given good results. Steam sterilizing does not appear to control damping off. Very little work up to the present has been done by the use of chemicals for sterilizing the seed beds.



THE "P. D. B." TREATMENT FOR BLUE MOLD ON TOBACCO PLANT BEDS ENCLOSED WITH POLES.

The heavy cover is fastened permanently in the center of the bed. This arrangement simplifies the use of one cover on two beds.

Blue Mold: A great deal of work has been done on the control of blue mold on tobacco seedlings. This is the most serious disease that has yet occurred in the seed beds. There appears to be but little difference in seriousness of attack of blue mold between thick and thin stands when the disease is in epidemic form. There are three methods of control, two of which are by fumigation, benzol and paradichlorobenzene. These two, if done properly by using heavy covers to confine the gases in the beds, are practically 100 per cent efficient. The third, a spray method using copper oxide-oil spray, is less expensive and less efficient. In years of mild disease attack, it is possible that this spray, properly applied, may give sufficient control to furnish an adequate supply of plants. Considering the number of plants produced on 100 square yards of bed, the fumigation methods are no more expensive and are more dependable.

Fertilizer Placement: The object of this experiment is to determine the best relative position of the plant in relation to the fertilizer. Such information is important since high analyses fertilizers are being used. After a number of variations have

been tried, it has been found that the plants live better and make a better yield when the fertilizer is placed approximately three inches on each side of the plant at about the base of the root crown. To do this economically improved inexpensive implements are desired.

Rotations: Rotation of tobacco with other field crops is necessary for the purpose of assisting in the control of diseases and for production of better quality leaf. In areas infested with Granville wilt, tobacco should not be grown after weeds. In areas where there is no wilt, it has been definitely determined that tobacco does best after a crop of weeds. In areas of limited tobacco acreage on the farm, tobacco, small grain, and weeds give excellent results provided the land is not infested with Granville wilt.

Nutrition Plats: This is a study of the effect of hairy vetch, crimson clover, weed fallow, check, cowpeas, soybeans, and lespedeza on tobacco, cotton, and corn, and the residual effect on wheat, oats, and rye. Tobacco does well after weed fallow and fairly well after lespedeza. With heavy rainfall in May and June, the tobacco after cowpeas and soybeans is fair. Crimson clover and vetch apparently supply too much nitrogen in all seasons. Cotton apparently does better after crimson clover than after the other legumes and corn gives a larger yield after vetch. Very heavy applications of potash were applied on half of each of the plats in 1939. In 1937, on the same half of these plats, 50 pounds of copper sulphate per acre were applied broadcast. At an early stage of growth in 1939, acute magnesium deficiency occurred on the half on which copper in 1937 and heavy rates of potash in 1939 had been applied. One ton per acre of magnesium limestone was applied broadcast to this field on November 1, 1919. Apparently the excess potassium ion had some effect on the available magnesium supply.

Sources of Nitrogen: In this test, cotton seed meal, soybean meal, tankage, ground fish, dried blood, urea, and nitrate soda were tested individually and in combination. The soil type on which this test was conducted is Enon sandy loam. Over a period of time the differences in yield and value were not as great as might be expected. Leaching apparently was not excessive on this soil type, which may partly explain these results.

Potash Plats: The potash in this series of plats was varied as follows: 30, 60, 120, 180, 240, and 300 pounds of K_2O per acre. The mixture might be considered, therefore, as a complete fertilizer including one-half pound of boron per acre in all the plats. The yields and values were definitely in favor of high potash up to 180 pounds per acre. When as much as 240 and 300 pounds

per acre were used, the curve began to straighten out and to turn down indicating that from 120 to 180 was approaching the maximum profit returns. In all cases where more than 60 pounds of potash per acre were used, the application of the extra potash was made in the side furrow, which would be approximately 3 to 4 inches on each side of the plant.

Secondary Elements: The object of this series of plats is to study the effect of calcium, magnesium, sulphur, and potassium on the yield and quality of tobacco. The plats range from no SO3 to 270 pounds, from no K_2O to 100 pounds, no CaO to 180 pounds and no MgO to 40 pounds per acre, one check plat with no nitrogen and no phosphorus, the remaining elements in these plats were constant. These studies were started on newly cleared land in Field 1 in 1933, and deficiencies were beginning to appear in 1938, but the crop before harvesting was destroyed by hail. In 1939, on the adjoining Field 11, which was started in 1936, some of the deficiencies began to appear. Potash and nitrogen deficiencies were quite distinct, magnesium and calcium deficiencies slight. It appears to be quite evident that all of these elements are essential.

EFFECT OF PHOSPHORUS ON GROWTH OF THE TOBACCO PLANT.

Four-row plats, photographed July 3, 1940.
Left: 1,000 pounds per acre of 2-6-6 fertilizer.
Right: 1,000 pounds per acre of 2-8-0 fertilizer.
Center: 1,000 pounds per acre of 2-0-6 fertilizer.

Limed and Unlimed Fertilizer Plats: This series consists of 18 plats in duplicate, making a total of 36 and is the oldest series

on the Station. These were begun in 1911 in a three-year rotation. The object of which was to determine, as we found out later in a limited way, the effect of the different sources and different rates of nitrogen, potash and phosphorus on the yield and quality of tobacco. It was soon discovered that on some of the plats on which we considered a complete mixture, both yield and quality were declining. Magnesium and calcium were both applied to half of these plats in the form of ground dolomitic limestone in 1920. The results were outstanding. The tobacco on the limed end of the plats gave larger yields with improved quality, which indicated very clearly the magnesium deficiency. These plats were limed each time preceding tobacco until a total of three tons per acre had been applied. By that time wild legumes were beginning to come in on the limed end of the plats and in the three-year rotation one crop of soybeans was grown and turned under. On the limed end of these plats the soybeans and weed growth following oats were decidedly better than on the unlimed end. As a result excess nitrogen has caused the tobacco to get coarse and rough with poor quality on the limed half of these plats and even with increased yield, the value has decreased. Even though the pH on the limed end of these plats has been constantly around 7, no black root-rot has appeared, which would indicate that the rotation has had a wholesome effect in preventing the development of this disease. So after all, this experiment is being conducted and might be considered a long time lime magnesium test.

Tobacco After Soybeans: The object of this experiment is to see if it is possible to produce good tobacco after a summer legume. The first 15 years cowpeas were seeded broadcast after a crop of oats and plowed in. For the past 12 years soybeans have been used. These tests were carried in a two-year rotation, tobacco one year and oats and soybeans the second year. The nitrogen is left out of the fertilizer and liberal applications of phosphorus and potash are used. It was later decided if the sulphur was omitted better colored tobacco might be secured. This has been true in a small way, but the results have not been sufficiently encouraging to recommend such a procedure for good farm practice.

Sulphur Tests: This series consists of 10, 1/20 acre plats for the purpose of studying the effect of reasonable amounts of SO3 and none on the color and quality of tobacco. The potash variable was 3 to 6 and 12 per cent. The nitrogen and phosphorus were constant. Apparently where 24 pounds K_2O were used per acre, there was very little difference between the sulphur and no sulphur plats, but when 96 pounds K_2O were used, there was some

difference in favor of reasonably high SO3 content indicating that where high potash is used sulphur is essential.

Spacing and Topping: This series consists of 24 plats with 800 pounds of 3-8-6 per acre on 12 plats and 1200 pounds per acre on 12 plats with tobacco spaced at 12, 18, 24, and 36 inches on the drill topped at 8 and 16 leaves and not topped. The object is to study the effect of heavy and medium rates of fertilizer application on the plats spaced at different distances on the drill. The indications are that in both rates of fertilizer application tobacco planted from 18 to 24 inches apart on the drill and topped around 16 leaves high gave the best results.

Black Shank (Phytophthora): This project consists of 4 acres of rented land near Walkertown in Forsyth County on which this disease was very serious. A large number of varieties have been studied for resistance. Hybrids of 301 have been developed which are highly resistant to this disease and are beginning to produce tobacco of fair flue-cured quality. The yields are comparable to the standard flue-cured types. Some of the most promising hybrids show above 90 per cent resistance. Back crosses and selections are continued and the indications are at present that a fairly good flue-cured variety will be developed within the next few years. Five or six year rotations using crops other than Irish potatoes, tomatoes, peppers, and egg plants are effective in controlling the disease along with control drainage.

Granville Wilt: On the 12 acres of leased land near Creedmoor, studies have been continued and intensified. A large number of varieties have been planted for the purpose of trying to find resistance. Chemicals and crop rotations have been used. Immune and susceptible crops have been classified. This has enabled us to plan a rotation of crops using only such crops as are immune or highly resistant to the disease. By following such a cropping system fairly effective control can be secured in a three and four year rotation. Chemical treatments have not shown very much promise. Varietal resistance has shown some encouragement. Up to the present, however, such varieties as are resistant to the disease produce tobacco of poor flue-cured quality, which means that crosses and back crosses have to be made from which careful selection must be made in order to develop both resistance and quality. Progress is being made on all three lines of attack.

Root-Knot: This disease, which is, perhaps, more widespread than any one in the State unless it is mosaic, is being studied in a 20 acre plat of land about ten miles south of Raleigh. This problem is being attacked from the standpoint of resistance, cropping system and chemicals. Up to the present a cropping

system using immune or highly resistant plants in the rotation shows the most promise. Cultural methods have shown some value. For instance, early planting of tobacco has consistently given better results than medium or late planting. Ridge cultivation has given better results than flat cultivation. In the cropping system, tobacco following two years of ordinary weeds and following corn, oats, and weeds have given good results and at the present time might be recommended.

Tobacco Curing: The curing of tobacco, which is the most important step in the process of growing flue-cured tobacco, has developed considerable interest during the past two or three years. The use of different fuels and different methods is important. Studies have been made of the oil burners, coal and electricity in comparison with wood for the purpose of supplying heat.

Ventilation, which is essential, has also been studied. The indications at present are that in the proper ventilation of tobacco preheated air is much more efficient and can be better controlled than where natural ventilation is depended upon. At the present stage of development, the use of coal by means of a stoker is, perhaps, the cheapest source of fuel.

Entomology (C. F. Stahl): The laboratory of the Bureau of Entomology and Plant Quarantine, established at Oxford on July 1, 1935, has been continuing studies on the principal insects affecting tobacco in the field. The tobacco flea beetle and hornworms have been the species which have received major attention.

In the studies on flea beetles, special emphasis has been placed on the development of control measures in plant beds and on the plants immediately after transplanting and on experiments designed to furnish information on the sources of infestations which occur in the fields.

Hornworm studies have been directed mainly toward the development of control measures involving the use of materials less objectionable from the standpoint of residues than the arsenicals. Factors affecting the survival during the winter have received special consideration.

Since July 1, 1939, the Bureau has also been actively engaged in studying the tobacco moth which has recently been found to be a serious pest of cured tobacco in the grower's pack houses. In addition to a study of the habits of this insect and a survey to determine its distribution and economic importance, special emphasis has been placed on pack house sanitation as a means of control.

UPPER COASTAL PLAIN STATION—ROCKY MOUNT, N. C.

R. E. CURRIN, JR., Assistant Director in Charge and Agent,
U. S. D. A.

Station Established in 1902.

Area of Station, 449 Acres. Soil Types: Marlboro, Rustan, Dunbar, Coxville with Norfolk Series predominating.

Elevation, 100 feet above sea level.

Climatological Data for 1939

Mean Annual Temperature, 61 degrees Fahrenheit.
Annual Rainfall, 46.72 inches. Total Snowfall, 8.2 inches.

GENERAL

This Station serves as a center for agricultural research for the Upper Coastal Plain region of the State. The principal lines of experimental work deal with tobacco, cotton, peanuts, corn, and soybeans.

During the past two years many improvements have been made on the new farm which was purchased in 1937. Old ditches have been deepened, widened, and cleared and approximately two miles of new ones have been cut. Several acres of new ground hav been cleared and put into cultivation. All houses have been painted and repaired and in 1939 a mule barn was built.

The North Carolina Highway Commission has completed a new hard surfaced road from Rocky Mount to the Station. Within a few weeks this paved road will be extended to Tarboro, thus making the Station readily accessible to all parts of the Upper Coastal Plain section.

AGRONOMY

The tobacco experiments are handled in coöperation with the Office of Tobacco Investigations, U. S. Department of Agriculture, W. W. GARNER, E. G. MOSS, AND J. P. YOUNG, *and the Department of Agronomy of N. C. State College,* E. R. COLLINS.

Tobacco Variety Test: A number of the leading varieties are being grown, most of which appear to be well suited to this locality. Special attention is being given to the selection of the thinner leaves that show greatest width and length while maintaining weight and improving color. Although Virginia Bright Leaf and Special 400 are the leaders, other selections show promise.

Tobacco Fertilizer Test: In 1938, two series of fertilizer plats were established. A third series for the study of different nitrogen sources was set up in 1940.

(1) The purpose of the first series is to study the relationship of potash and sulphur as they affect the growth, quality, and ripening of flue-cured tobacco. To date the potash appears to be

the controlling factor since the sulphur characteristics have not become appreciably defined.

(2) In the second series, the objective is to study the effects of calcium, magnesium, phosphorus, and sulphur on the growth, quality, and ripening of flue-cured tobacco. At this time the heavier applications of phosphorus appear to have improved both the weight and quality of the tobacco. The effect of the calcium, magnesium, and sulphur are undetermined.

(3) The nitrogen studies have not been under observation long enough to warrant any conclusions.

Cotton Breeding and Development (P. H. Kime): Work in progress during the past two years included variety tests, breeding work with the Mexican variety, and hybridization.

(1) During 1938 and 1939, four acres were devoted to variety work. Sixteen varieties, including the principal commercial varieties grown in the State, were tested. Leading varieties from the standpoint of yield and money value were Coker 100, Deltapine, and Mexican. During the season of 1940, twenty-five varieties and strains are being tested.

(2) Breeding work from the Mexican variety has been in progress at this Station for a number of years. Line selection with some inbreeding is the method used. A large number of plant-to-row progenies and strains are tested each year. Seventy strains, or lines tracing back to individual plant selections, are in yield this year. An increase block of approximately twelve acres of a new strain of Mexican is also being grown during 1940.

(3) A large number of hybrids have been grown during the period of 1938-1940. These are principally double crosses and represent various combinations of commercial varieties. A considerable number of plant-to-row progenies from these hybrids are being grown in 1940. The original hybrids are being grown in further selection.

Several hundred bushels of pedigreed seed have been distributed to the farmers of this section.

Cotton Fertilizing Methods (E. R. Collins): Studies in different methods of applying fertilizers to cotton have led to very definite conclusions that placing the fertilizer 2½" to the side and 1" below the seed gives a better stand of plants and yield of cotton as an average over a nine year period. Several commercial types of planters and fertilizer distributors were tried out to determine their efficiency in the placement of fertilizer. Very few of the one-horse drawn machines have proved satisfactory. Some machines did not distribute fertilizer uniformly, some placed it improperly, and still others were mechanically defective. One of the two-horse drawn machines did the work fine in every

respect; however, its cost would make it impractical for use by small farmers.

Improvement of Peanuts by Breeding and Selection (G. K. Middleton):

(1) The objective has been the development of peanuts through hybridization and selection which will be superior to those commonly grown, in yielding ability, in oil content, and in resistance to disease.

(2) Several methods were used, including (a) exploring the possibility of improvement by selection in farmers' stock or in hybrid material, (b) studying the application of varieties to different soil types and their relative response to fertilization, and (c) studying the relative susceptibility of varieties to disease.

(3) The following are results: (a) Virginia Bunch peanuts generally produce better than other varieties on the Station and one of the best strains, No. 8, is being distributed. In certain outlying tests, however, large runners have shown up best, especially in tests at Hertford. (b) Disease notes taken on twenty strains show Valencia and Spanish more susceptible than the large types to Sclerotium rolfsii. (c) Crossing of the main peanut types began in 1938. In the field in 1940 there are progenies from seventy crosses in the third generation; fifteen in the first and thirty in the second. (d) Special studies are underway to determine the most efficient method of conducting tests with peanuts.

A Study of Lime, Gypsum, and Fertilizer Treatment at Different Rates, on Stand, Yield, and Quality of Peanuts (E. R. Collins): This study includes time of application of gypsum, comparison of lime and potash lime at planting and as a side dressing and a comparison of different sources of potash and side dressing materials. This work having been begun only recently, no definite statements can be made.

Corn Breeding (P. H. Harvey): Corn hybrid yield tests were conducted on three locations with 150 commercial and experimental hybrids obtained mainly from the Corn Belt States. The results of these tests are published in Agronomy Information Circular 114. The local varieties are definitely superior to most, if not all, of the western hybrids.

Breeding Work, 1939 (P. H. Harvey): The 1939 breeding field contained the following: 350 third generation local selfed lines; 120 out-of-state inbreds; 250 single crosses for observation, crossing, and convergent improvement; and 1400 first generation selfed lines. About 8000 hand pollinations were made. Earworms and dry weather during the season caused some loss.

However, less ear rots occurred, therefore the seed supply is good for 1940.

Top Cross Tests (P. H. Harvey): Ten of ninety-five top crosses of second generation local selfed lines yielded ten to thirty per cent above the check variety, Jarvis Golden Prolific. That is, about ten per cent of the trial top crosses exceeded the variety by more than ten per cent. Of a group of sixty-five top crosses (mostly of Corn Belt inbreds), thirty-three exceeded the best local variety by ten to thirty-six per cent in yield. Twelve of these had a quality of grain equal to that of the local varieties.

Experimental Hybrid Yield Test (P. H. Harvey): Six of twenty-seven white single crosses exceeded the best variety by ten to thirty-two per cent. All six involved inbreds from the Kentucky Agricultural Experiment Station. Twenty-six of sixty-three yellow single crosses exceeded the variety by ten to forty-two per cent in yield. These single crosses had both local (self generation selfs) and Corn Belt inbreds. The local strains combined well together and also worked well in combination with Corn Belt inbreds. Forty-two three way combinations (mostly comprised of Iowa single crosses with one local strain) had twelve exceed the varieties ten to twenty-eight per cent. Ten of thirty-one double crosses (Yellow Horsetooth single crosses X Iowa single crosses) exceeded the best variety. Only ten were above the variety in yield. In plant type and lodging resistance of most of these, hybrids were superior to the varieties. Grain quality, weevil resistance, and earworm resistance varied considerably. One of the top three hybrids was equally as good as the local varieties in these last mentioned qualities.

Corn Belt Hybrid Yield Test, 1939 (P. H. Harvey): Commercial and experimental hybrids from out-of-state sources did outyield the varieties, but were lacking in quality, weevil resistance, and earworm resistance. From results obtained in 1938 and 1939, it is quite definite that none of the Corn Belt or western hybrids can be grown economically. There may be exceptions to this generalization, however, such as special use as an early crop for hogging off in August, or for late planting following a truck crop.

Corn Fertilizer (E. R. Collins): Placement studies with corn have indicated that for normal applications of fertilizer, side application does not show much advantage in final yield.

Soybean Varieties (R. L. Lovvorn): Soybean variety tests are under study at the present time. No data is available, however, upon which any conclusions may be drawn.

PATHOLOGY

Blue-mold Control (J. P. Young): The use of Paradichlorobenzene on plant beds gave almost perfect control of Blue-mold.

Cotton Seed Treatment (S. G. Lehman): An intensive series of studies on cotton seed treatment have been made. These have been directed along the following lines:

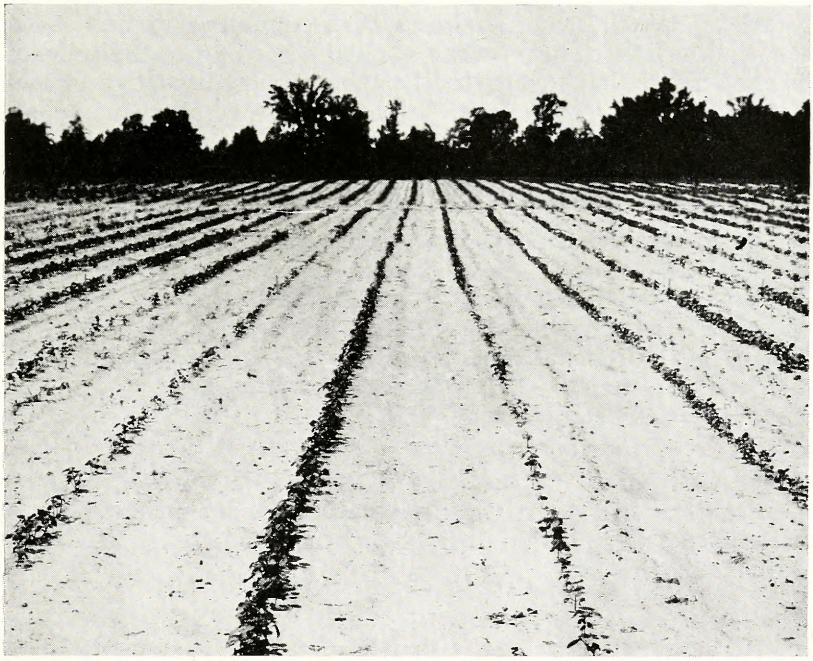
(1) Comparison of different dusting materials with Ceresan, the preparation now most widely used for cotton seed treatment.

(2) Tests of the value of delinting by use of acid and by use of machinery both with and without dusting.

(3) Comparison of the relative benefits arising from treatment of seed lightly and heavily infested with disease producing organisms.

(4) Identification of the fungi chiefly responsible for poor stands of cotton seedlings and for boll rots.

All these lines of study have yielded valuable information pointing to definite improvements in cotton seed treatment practice.



COTTON SEED TREATMENT AT UPPER COASTAL PLAIN BRANCH STATION, 1940.

Stand of seedlings at thinning time from seed not dusted and from seed dusted with new improved Ceresan. Middle row, left: 50 feet beyond stake, seed dusted; next 100 feet, seed not dusted. Middle row, right: first 50 feet beyond stake, seed not dusted; next 100 feet, seed dusted.

Control of Cercospora Leafspot of Peanuts (R. F. Poole and Luther Shaw): Studies on the control of Cercospora leafspot of

peanuts have been underway for the past two years. Two major lines of investigation are in progress:

(1) Studies on the timing of fungicidal application for the most effective and the most economical control of leafspot.

(2) Studies in the efficiency of different fungicidal materials, especially sprays vs. dusts, in the control of leafspot.

Results of these tests to date indicate that the most economical schedule to follow in the application of fungicides to control leafspot of peanuts is to make four applications at two-week intervals, beginning between July 1st and 20th. Increased yields from such treatment have averaged about 500 pounds of peanuts and 800 pounds of hay per acre, at a cost of approximately $5 per acre, including both material and labor. Studies in the efficiency of different fungicidal materials have not progressed to the point that definite efficiency values can be given to the materials under study. However, taking into consideration all of the data obtained to date, it can be stated that sulphur dust and 4-4-50 Bordeaux mixture spray, when applied according to the schedule outlined above, have consistently given practical control of leafspot and economical increase in the yields of both peanuts and hay.

Cause and Control of Root Rot Disease in Peanuts (R. F. Poole and Luther Shaw): Studies on the cause and control of root rot disease of peanuts have been underway for three years. Studies on cause have shown Rhizoctonia root rot to be equally as important, if not more so, than Southern root rot in causing losses. Studies on control have involved three major lines of approach: (1) Crop rotation. (2) Chemical soil treatments. And (3) Seed treatments. This work has not progressed to the point that conclusions can be made.

ENTOMOLOGY

Cotton Insect Studies (Z. P. Metcalf): Work on the study of cotton insects was begun during the Spring of 1940. No data is available on this study at present.

GENERAL INDEX

	Page
ACCOUNTS, DIVISION OF	101
Disbursements, Statement of	101
Receipts, Statement of	106
State Fair, Receipts and Disbursements	108
Tax Rate on Feeding Stuffs	109
Tax Stamps	109
Tax Tags	109
AGRICULTURAL PRODUCTION, 1939-1940	15
AGRICULTURAL REVIEW	24
CHEMISTRY, DIVISION OF	26
Bottled Drinks	30
Canned Goods	29
Commercial Feeds	26
Fertilizers	26
Flavoring Extracts	28
Foods	27
Ice Cream, Definition and Standards for	30
Meats	29
Miscellaneous Samples	30
COLTRANE, D. S., ASSISTANT TO COMMISSIONER	15
CREDIT UNIONS, DIVISION OF	47
Condensed Statement of	48
DAIRY DIVISION	44
Statistical Report	46
DAIRY PRODUCTION STATISTICS LAW	45
ENTOMOLOGY, DIVISION OF	32
Apiary Inspection	33
Blister Rust Prevention	34
Duties	32
European Corn Borer	42
Insect Taxonomy	34
Japanese Beetle Work	38
Narcissus Bulb Inspection	41
Native Plant Collector's Permit	32
Nursery Dealer Certificate	32
Phony Peach Eradication	41
White Pine	37

GENERAL INDEX—*Con.*

	Page
FEED SALES AND INSPECTION	19
Inspection Summary	22
FERTILIZER, INSPECTION	18
Adopted Grades	21
Excess Plant Food Given	18
Grade Reduction	21
Inspection Summary	22
Uniform Law	22
FERTILIZER, LIME AND LAND PLASTER	17
FINANCIAL STATEMENT	101
FOOD, DRUG AND COSMETIC LAW, NEW	31
FOODS	27
INSECTICIDES AND FUNGICIDES	27
MARKETS, DIVISION OF	49
Dairy Products, Promotion of	50
Egg Law Enforcement	50
Field Crops Marketing	49
Fruit and Vegetable Marketing	52
Inspection Service	54
Livestock Marketing	59
Marketing, Need For Expansion	11
Moving Pictures, Marketing	63
News Service, Market	61
Poultry Marketing	50
Produce Markets, New	58
Stabilization and Standardization	56
Surplus Commodity Purchases	58
Tobacco Standardization	58
MUSEUM, DIVISION OF	65
Accessions	65
Attendance	67
Cooperative Work	68
Exhibits	65
Publications	67
PERSONNEL	5
PROGRESS REPORT	11

GENERAL INDEX—*Con.*

	Page
PUBLICATIONS, DIVISION OF	24
Agricultural Review	24
State Fair Publicity	25
SCOTT, COMMISSIONER W. KERR, REPORT OF	11
SEED INSPECTION	20
Inspection Summary	23
SEED LABORATORY, DIVISION OF	70
Seizures and Withdrawals	70
Statistical Report	70
SOIL TESTING, DIVISION OF	71
Educational Phase	72
Laboratory	71
Samples Tested	73
STATE FAIR, DIVISION OF	100
STATISTICS, DIVISION OF	76
County Estimates Made	76
Crop Reports Collected	76
Crop Reporting Service, Rank of	77
Farm Census	76
New Features	82
Releases	76
SUMMARY OF PROGRESS	11
TEST FARMS, DIVISION OF	110
Blackland Station, Wenona	111
Coastal Plain Station, Willard	117
Improvements	110
Mountain Station, Swannanoa	130
Piedmont Station, Statesville	137
Tobacco Station, Oxford	144
Upper Coastal Plain Station, Rocky Mount	153
VETERINARY, DIVISION OF	84
Anthrax	90
Bang's Disease	84
Bovine Tuberculosis	86
Cattle Fever Tick	87
Clinics	90
Equine Encephalomyelitis	94
Hog Cholera	91

GENERAL INDEX—*Con.*

Page

Public Livestock Auction Markets ---------- 94
Pullorum Disease ---------- 87
Rabies ---------- 88
Swine Diseases ---------- 91

WAREHOUSE, DIVISION OF ---------- 96
Financial Standing ---------- 96
Loans to Warehouses ---------- 97

WEIGHTS AND MEASURES, DIVISION OF ---------- 98
Weigh Master Act ---------- 98
Weights, Measures and Devices Inspected ---------- 99